Quick Start Guide to FFmpeg

Learn to use the open-source command-line multimedia-processing tool like a pro

V. Subhash

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FFmpeg version: 5.1 "Riemann" LTS

Dedicated to the creators and supporters of free and open-source software

List of contents

About the author

V. Subhash is an invisible Indian writer, programmer and illustrator. In 2020, he wrote one of the biggest jokebooks of all time and then ended up with over two dozen mostly non-fiction books including *Linux Command-Line Tips & Tricks*, *CommonMark Ready Reference*, *PC Hardware Explained*, *Cool Electronic Projects* and *How To Install Solar*. He wrote, illustrated, designed and produced all of his books using only open-source software. Subhash has programmed in more than a dozen languages (as varied as assembly and Java), published software for desktop (*NetCheck*), mobile (*Subhash Browser & RSS Reader*) and web (*TweetsToRSS*), and designed several websites. As of 2022, he is working on a portable Javascript-free CMS using plain-jane PHP and SQLite. Subhash also occasionally writes for *Open Source For You* magazine and *CodeProject.com*.

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- the publisher Apress. They insisted on not using any third-party video for the screenshots, as the author did in the original self-published book (*FFmpeg Quick Hacks*). Most screenshots in this Apress book were taken from the author's own videos. The rest used videos and images that were in the public domain (Archive.org, Pixabay.com and Unsplash.com). This led to a rewrite of most of the content and several mistakes were discovered and eliminated.
- the technical reviewer Gyan Doshi for pointing out several other mistakes and making valuable suggestions.
- creators and supporters of *free and open-source* projects.
- the author's family, friends, enemies and governments without whose help and encouragement this book would have been completed much ahead of its deadline.

About the technical reviewer

Gyan Doshi has been with the FFmpeg project as a developer and maintainer since 2018. During this time, he has focussed on FFmpeg filters, formats and command-line tools. From his experience in video post-production stages such as editing and motion graphics, Gyan has learned how FFmpeg can be used in multimedia workflows as a valuable addition or as a substitute for expensive tools. Aside from being engaged as a multimedia/FFmpeg consultant, Gyan also troubleshoots FFmpeg issues on online forums such as Stack Exchange and Reddit.

Gyan builds the official Windows binary packages of FFmpeg (`ffmpeg`, `ffprobe` and `ffplay`) and other tools (`ffescape`, `ffeval`, `graph2dot`...), and offers them for download from his website at:

> **www.gyan.dev**

Learn to quickly use the free command-line utility FFMPEG to cut, copy, record, edit, tag, convert, rotate, flip, resize, crop, combine, compose, blur, sharpen, smoothen, side-by-side split, PIP inset, fade in/out video files... Also learn to process audio, images, animations, fonts, subtitles and metadata.

FFmpeg Quick Hacks

★ Extensive tutorial ★ Hack collection ★ Ready Reference

V. Subhash

FFmpeg Quick Hacks

Written, illustrated & designed by
V. Subhash

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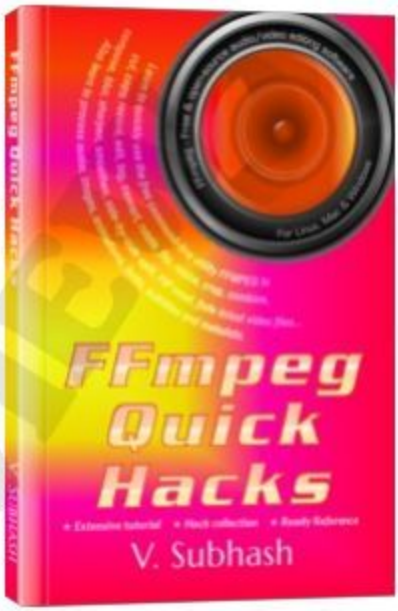
(**www.VSubhash.in**)

Updates

- This book was last updated in April 2023
- The code snippets were tested with **FFmpeg version 6.0** (released in January 2023)



Acknowledgement and thanks

- Lou Logan for reviewing this book
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- Laurie Lennon for the parody of *Oh, Wolfie* song
- *Tom & Jerry* cartoon *Baby Puss*
- *Baywatch* (for Pamela Anderson and Yasmine Bleeth)

Contents

- `0:a:0` (first file's first audio stream) or `0:1` (first file's second stream)
- `1:v:0` (second file's first video stream) or `1:0` (second file's first stream)

For this to become clear, you will have to spend some time studying the last screenshot.

Suppose that a multi-language DVD video file had one video stream and two audio language streams. The streams can be referred as:

- `0:v:0` (first video stream) or `0:0` (first stream)
- `0:a:0` (first audio stream) or `0:1` (second stream)
- `0:a:1` (second audio stream) or `0:2` (third stream)

> ☞ In the output of `ffmpeg` commands, you will encounter index numbers ignoring the stream type. To make your FFmpeg commands somewhat fail-safe, I recommend that you refer to streams by their type instead.

As you may have guessed, the stream type identifier for video is `v` and `a` for audio. There are other such identifiers as given in this table.

Stream-type identifiers

Stream Type	Identifier
Audio	a
Video	v
Video (not images)	V
Subtitles	s
File attachments	t
Data	d

After displaying the information about the input files and streams, `ffmpeg` will list how the input streams will be processed and mapped to intermediate and final streams. Then, it will list the final output files and their streams. In a `bash` terminal, you can press the key combination Ctrl+S if you wish to pause and study this information. Otherwise, all of this information will quickly flash past your terminal as `ffmpeg` will then post a huge log of informational, warning and error messages as it performs the actual processing of the input data.

Maps

With multiple input files, FFmpeg will use an internal logic to choose which input streams will end up in the output file. To override that, you can use the `-map` option. Maps enable you to specify your own selection and order of streams for the output file. You can specify stream mapping in several ways:

> `-map InputFileIndex`
> all streams in file with specified index

For example, `-map 1` means
all streams in second (1) input file

`-map InputFileIndex:StreamIndex`
the stream with specified index in file with specified index

For example, `-map 0:2` means
third (2) stream in first (0) input file

`-map InputFileIndex:StreamTypeIdentifier`
all streams of specified type in file with specified index

For example, `-map 1:s` means
all subtitles (s) streams in second (1) input file

`-map InputFileIndex:StreamTypeIdentifier:StreamIndex`
among streams of specified type in file with specified index, the stream with specified index

For example, `-map 2:s:1` means
second (1) subtitle (s) stream in third (2) input file

Information overload? Let me explain with an example. When I created this stop-motion video a few years ago, I used a gramophone recording as the background music. Typical of old record music, it had a lot of sound artifacts. At that time, I did not know much about FFmpeg. So, I used FFmpeg to extract the audio as an MP3 file but used the free *Audacity* program to apply a *low-pass filter*. Then, I used FFmpeg again to swap the original audio with the MP3 fixed by Audacity.

```
# Extract the audio
ffmpeg -i Stopmotion-hot-wheels.mp4 \
       -map 0:1 \
       Stopmotion-hot-wheels.mp3
```

Audio extraction

Some video files have great sound. Music videos are good examples. How do you extract their audio? Well, drop the video stream and copy the audio stream to an audio file.

```
# Matroska audio
ffmpeg -i music-video.mp4 -c:a copy music-video.mka
# MPEG4 audio - FFmpeg flounders
ffmpeg -i music-video.mp4 -vn -c:a copy music-video.m4a
```

☞ Without the `-vn` option, the video stream will be copied! Hurray for redundant options! *Le paranoid survive!*

Matroska audio or '.mka' files support several audio codecs. The '.m4a' files support AAC (MPEG4 audio) codec.

If you already know that the audio stream in the MP4 file has been encoded with MP3 codec (as they do sometimes), you can `-codec:a copy` the audio stream to a '.mp3' file. Most of the time, however, you will have to *encode* it to MP3. Files with extension '.mka' and '.m4a' are not supported by many playback devices. The following command converts the audio stream of the video file using the Lame encoder to create a two-channel (stereo) MP3 file encoded at 128K bitrate.

```
ffmpeg -i music-video.mp4 \
       -c:a libmp3lame -b:a 128K -ac 2 \
       music-video.mp3
```

You can simultaneously output audio in different bitrates using multiple `-map` options.

```
ffmpeg -i music-video.mp4 \
  -vn \
  -map 0:a -c:a libmp3lame -b:a 128K music-high.mp3 \
  -map 0:a -c:a libmp3lame -b:a 64K music-low.mp3
```

☞ As one understands, this is strictly for limited doomsday archival purposes... Several films and music records have been lost to studio fires. Anything can happen. Cite the 2020 pandemic. ☺

Extract stills from a video (video-to-image conversion)

To extract video frames as image files, you need to use the `-f image2` option. The numbering of the images is specified in the name of the output file. The format mask is similar to the `printf` function of the C programming language. In this command, `%` is for character output, `0` is for padding with zeros instead of spaces, `3` is for the total number of digits, and `d` is for integer numbers.

```
# Extract images at the rate of 1 frame per second from the video
```

```
ffmpeg -y -i baywatch.mp4 \
       -r 1 \
       -f image2 \
       babe%03d.jpg 2> /dev/null
```

☞ Most videos are encoded with a frame rate of 24, 25, 30 or even 60 frames per second. Be careful with your extraction rate and length of the video or you will quickly run out of space.

Use the `-r` option to restrict the number of images generated for a second of the source video. You can omit the `-r` option to extract all frames (and let it be determined by the frame rate of the source video) but

- use small video clips as the source or

- use `-t` and `-ss` options (described in the *Editing videos chapter* [43]) to restrict the extracted duration of the source video.

Create video from images (image-to-video conversion)

FFmpeg can also do the reverse by creating a video from several images (when they are numbered serially). The duration of the video depends on the number of images available and frame rate you have specified. If the `-r` option in the video-to-image conversion was higher (in the previous command), say between 12 and 30, a lot more images would have been extracted and this video would have been smoother.

```
ffmpeg -r 1 -i babe%03d.jpg \
       -s qvga -pix_fmt yuv420p \
       babe.mp4 2> /dev/null

ffplay -autoexit \
       babe.mp4 2> /dev/null
```

☞ All input images should be of the same format and dimensions.

☞ The `-pix_fmt yuv420p` option is necessary to ensure such unusual video files play all right in most media player devices.

Image conversion settings

This table lists some FFmpeg conversion options that are useful when working

with image files. Although this book will describe how to use them, more comprehensive information will be found in the official FFmpeg documentation.

`ffmpeg` image-conversion options and examples

Option	Purpose
`-f image2`	Force conversion to and from images
`-f image2pipe`	Force image conversion for output piped over to another command
`-loop 1`	Repeat the processing of the input image indefinitely
`-pix_fmt yuv420p`	Use `yuv420p` pixel format when converting to image formats

Create a slideshow from images

☞ This video was created from several disproportionate images.

In the previous section, the output video ran out quickly because there were not many input images. If you want each input image to appear for longer than a second, then you need to specify a `-framerate` option for them as well. An input frame rate of 1/3 ensures that a frame plays for 3 seconds.

```
ffmpeg -y -framerate 1/3 -i image%02d.jpg \
```

```
          -filter:v \
             "scale=eval=frame:w=640:h=480:
              force_original_aspect_ratio=decrease,
              pad=640:480:(ow-iw)/2:(oh-ih)/2:yellow" \
          -pix_fmt yuv420p -r 24 \
          slide.mp4
```

☞ You will learn more about filters in *their own chapter*. [45]

The above command also takes care of images with irregular dimensions and ensures that they are resized appropriately.

When you have input images in no particular naming sequence, then you can pipe them.

```
cat *.png | \
     ffmpeg -y -f image2pipe \
            -framerate 1/3 -i - \
            -filter:v \
              "scale=eval=frame:w=640:h=360:
               force_original_aspect_ratio=decrease,
               pad=640:360:(ow-iw)/2:(oh-ih)/2:black" \
            -c:v libx264 -r 24 -s nhd -pix_fmt yuv420p \
            slide2.mp4
```

Create a GIF from a video

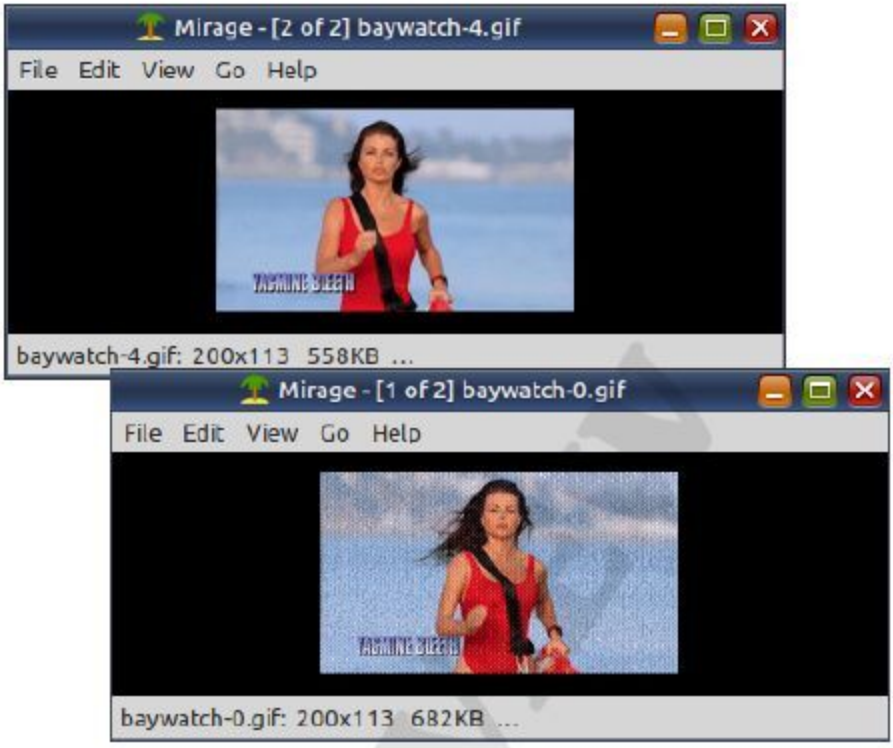
The ancient GIF format supports only 256 colors. You need to use `palettegen` and `paletteuse` filters to downsample the source video to this limited number of colors.

```
ffmpeg -y  -i baywatch.mp4 \
       -filter_complex \
         "fps=7,scale=w=320:h=-1:flags=lanczos,split[v1][v2];
          [v1]palettegen=stats_mode=diff[p];
          [v2][p]paletteuse=dither=bayer:bayer_scale=4" \
        baywatch-4.gif
```

You need to experiment a lot with the filters to understand what will work and what will not. A set of values that do well to optimize the file size for one source video may do poorly for another video. GIF optimization is extremely unpredictable. Learn more from this article:

> **https://engineering.giphy.com/how-to-make-gifs-with-ffmpeg/**

Here are the results of my investigation: With a `bayer_scale` of 0 (with the `dither=bayer` mode), the animation is smooth but suffers from the appearance of a dotted texture. The file size is on the higher side. As you move to the highest value of 5 (default is 2), the frames are clearer but start to suffer from intermittent banding. The file size is smaller.



☞ This is my software implementation of Chandler Bing's *Run, Yasmine! Run!*.

If you are stuck with an older version of FFmpeg that does not have the `palettegen` and `paletteuse` filters, you can make FFmpeg output the frames to ImageMagick (`convert` or `magick`). (The hyphens in the following command refers to standard output and input.)

```
ffmpeg -y -i baywatch.mp4 \
       -filter:v "fps=10,scale=w=320:h=-1:flags=lanczos" \
       -c:v ppm \
       -f image2pipe - | \
  convert -delay 10 -  \
          -loop 0 \
          -layers optimize \
          baywatch.gif
```

APNG

A better alternative to GIF animations is APNG. This format has limited support from image-viewing and image-editing applications but has near-universal support from desktop and mobile web browsers. Like PNG and unlike GIF, APNG supports millions of colours. This means that its colours will not have to be downsampled and will be very close to those in the source content. APNG animation files are typically bigger than animated GIFs.

If you are converting GIF animations to APNGs, then ImageMagick is the tool you should use, not `ffmpeg`.

```
magick animated.gif animated.apng
```

The image frames in a GIF will already be downsampled to 256 colours. To create a richer animated PNG, try to use the source frames in PNG format.

```
magick -delay 200 -loop 0 \
       chapter-image-*.png \
       -units PixelsPerInch -density 72 -resize '>x300' \
       animation-unlikely-stories.apng
```

If you are converting a video to APNG, then you can use `ffmpeg`.

```
ffmpeg -i bw.m4v \
       -vf "scale=w=250:h=-2, hqdn3d, fps=6" \
       -dpi 72 -plays 0 \
       bw.apng
```

In this command, `-dpi` is an APNG encoder option and `-plays` is an APNG muxer option. The *high-quality denoise 3d* filter reduces blemishes introduced by the scaling filter. Learn more about these options from the official documentation or by typing:

```
ffmpeg -help muxer=apng
ffmpeg -help encoder=png
ffmpeg -help filter=hqdn3d
```

Create a video using an image and an MP3

How do you play an MP3 in a media player that will only play MP4 files? Find a thumbnail or album art for the MP3 and churn it out as a video. The following command uses the image as a video stream encoded with MJPEG codec.

```
ffmpeg -i Blobfish_face.jpg -i blobfish.mp3 \
       -c:v mjpeg -c:a copy \
       -map 0:v:0 -map 1:a:0 \
       -disposition:v:0 attached_pic \
       "Weird Fins - 17 - The Blobfish.mp4"
```

This command generates only one image frame in the MP4. The image frame is not encoded as a regular video stream for the entire duration of the audio.

☞ This video does not really have any video, just one frame from an image.

However, not all media players will accept this trickery. On my computer, Totem media player does not show the image at all and plays it like a regular audio file. VLC displays the image because it uses FFmpeg internally. If your player shirks its duty, you will have to encode the image for the full duration of the audio.

```
fmpeg -y -i  blobfish.mp3 \
  -loop 1 -framerate 12 -i Blobfish_face.jpg \
  -shortest -s qvga -c:a copy \
  -c:v libx264 -pix_fmt yuv420p \
  "Weird Fins - 17 - The Blobfish (no tricks).mp4"
```

☞ This MP3 was part of 18 MP3 files of the 'Weird Fins' podcast published by the US NOAA. It

Editing videos

I used to save DVDs as ISO files (whole-DVD backups) so that I could play them on my media player box. Each ISO took up several gigabytes (GBs) on my hard disk that I eventually ran out of space. Now, I use FFmpeg and store DVDs as MP4s of around just 1 GB.

While FFmpeg makes it very easy to convert multimedia files, as you learned in the previous chapter, storing them in their entity is not always feasible or required. Sometimes, you need just a few clips, not the whole shebang. You may want to combine parts of one video with parts of other videos. You can also downsize the videos to conserve space. In `ffmpeg` terms, you want to cut, concatenate and resize videos. In this chapter, you will learn to do just that.

Resize a video

You can resize a video using the `-s` option. The dimensions of a video is usually specified as *Width*x*Height*. That is an 'x' as in 'x-mas' in the middle. When editing or converting videos, you will have to specify the video dimension using this syntax. This command resizes a VGA-size (640x480) video to a VCD-size (352x288) video.

```
ffmpeg -i dialup.mp4 \
       -s 352x288 \
       dialup.mpg
```

FFmpeg supports certain easy-to-remember literals that you can use in place of the actual values for the `-s` option.

Table 6-1: FFmpeg option and values for setting the dimensions of a video

Option	For
-s	Video dimensions (literal or actual)

Literal	Dimensions	Literal	Dimensions	Literal	Dimensions
ntsc	720x480	uxga	1600x1200	hd1080	1920x1080
pal	720x576	qxga	2048x1536	2k	2048x1080
qntsc	352x240	sxga	1280x1024	2kflat	1998x1080
qpal	352x288	qsxga	2560x2048	2kscope	2048x858
sntsc	640x480	hsxga	5120x4096	4k	4096x2160
spal	768x576	wvga	852x480	4kflat	3996x2160
film	352x240	wxga	1366x768	4kscope	4096x1716
ntsc-film	352x240	wsxga	1600x1024	nhd	640x360

sqcif	128x96	wuxga	1920x1200	hqvga	240x160
qcif	176x144	woxga	2560x1600	wqvga	400x240
cif	352x288	wqsxga	3200x2048	fwqvga	432x240
4cif	704x576	wquxga	3840x2400	hvga	480x320
16cif	1408x1152	whsxga	6400x4096	qhd	960x540
qqvga	160x120	whuxga	7680x4800	2kdci	2048x1080
qvga	320x240	cga	320x200	4kdci	4096x2160
vga	640x480	ega	640x350	uhd2160	3840x2160
svga	800x600	hd480	852x480	uhd4320	7680x4320
xga	1024x768	hd720	1280x720		

A video's horizontal dimension divided by the vertical dimension is sometimes referred as the **aspect ratio**. This is further influenced by the dimensions of individual pixels that make up the video. (Remember that a video frame is a matrix of dots or pixels in lines and columns.) This pixel-level aspect ratio is known as the **Sample Aspect Ratio (SAR)**. When a video is resized, FFmpeg (or whichever video authoring software that is used) would have automatically adjusted the pixel dimensions (or the SAR) from square to rectangular so that the video will be played with the proper aspect ratio. If you want a video to be played at a particular aspect ratio, you need to set the **Display Aspect Ratio (DAR)**. This value is calculated by the width-and-height ratio multiplied by the SAR.

These ratios may seem similar but there are subtle differences.

Terms related to video dimensions

Term	Description
Aspect ratio	= video width ÷ video height Standard definition ratio is 4:3. For widescreen, it is 16:9.
Sample Aspect Ratio (SAR) a.k.a **Pixel Aspect Ratio**	= pixel width ÷ pixel height For square pixels, it is 1. For rectangular pixels, it will be a fraction.
Display Aspect Ratio (DAR)	= (video width ÷ video height) × sample aspect ratio or = video aspect ratio × sample aspect ratio

If for some reason, the SAR value is not present in the video, it is assumed to be 1. If this makes the video distorted, set the desired DAR using the setdar filter and let FFmpeg figure out the internal SAR.

```
ffmpeg -i "distorted.mpg" \
```

```
        -vf setdar=dar=4/3 \
        restored.mpg
```

☞ You will learn more about filters in *its own chapter*. [46]

Editing options

More `ffmpeg` options for editing

Option	For
`-t`	Duration (in `hh:mm:ss[.xxx]` format or in seconds) of the output file.
`-ss`	Timestamp of playback location (`in hh:mm:ss[.xxx]` format or in seconds) from which processing needs to be performed
`-c:v`, `-c:a`, `-c:s`	Use specified encoder (not codec) for specific type of stream If you use the value `copy` as in `-c copy`, `ffmpeg` will not use an encoder and just copy the stream(s).

Cut a portion of a video

If the video segment that you want to remove is the beginning, then use the `-ss` option to specify the timestamp from which the content needs to be copied.

```
fmpeg -ss 00:01:00 -i sponsored-video.mp4 \
      the-video.mp4
```

☞ Use the `-ss` option before the `-i` option so that `ffmpeg` can quickly jump to the location of the specified timestamp. If you place it after the input file and before the output file, there will be a delay as `ffmpeg` decodes all the data from the beginning to the timestamp and then discards it (as it is not wanted)!

The timestamp values can be specified in the format `hh:mm:ss.ms`. Parts that are zero in the beginning can be omitted.

Examples of time or duration values

Usage	Implication
20	20 seconds
1:20	One minute and 20 seconds
02:01:20	Two hours, one minute and 20 seconds
02:01:20.220	Two hours, one minute, 20 seconds and 220 milliseconds
20.020	20 seconds and 20 milliseconds

☞ Before the milliseconds value, there needs to be a dot, not a colon.

If the video segment that you want to remove is the ending, then use `-t` option to specify the duration of the content that needs to be copied from the beginning.

```
ffmpeg -i long-tail.mp4 \
       -t 00:01:00 \
       no-monkey.mp4
```

If you want to cut from the middle, then you need to use both options.

```
ffmpeg -ss 00:01:00 -i side-burns.mp4 \
       -t 00:1:10 \
       clean-shaved.mp4
```

☞ In this case, `ffmpeg` starts cutting `-t` duration of content from the timestamp specified by the `-ss` option, not from the beginning.

All of these commands will re-encode the video. Because the (raw) source video (from which the input video was created) is not being used, the output video will have lesser quality and have freshly introduced blemishes and artefacts.

You may encounter another problem here. When you do not specify conversion settings, then FFmpeg will use its own default encoder settings. If your uncut

```
    [0:a]atempo=4[a]" \
  -map '[v]' -map '[a]' \
  barb-speed.mp4
```

☞ In older versions of FFmpeg, the maximum limit of the `atempo` filter was just two. To go beyond that limit, multiple filters had to be daisy-chained: `atempo=2, atempo=2`

Slow down a video

In the *Tom & Jerry* film *Baby Puss*, one of the alley cats tries to dance with a seemingly innocuous doll. In the middle of it, I thought, the doll had become possessed and slammed the cat down on the floor! I slowed the video down with FFmpeg and my suspicions were confirmed.

To slow down a video, you need to use the same filters as in the previous section but the multipliers will have to be different.

This command slows down the video and the audio to one-fourth.

```
ffmpeg -y -i tom.mp4 \
  -filter_complex \
    "[0:v]setpts=PTS*4[v];
     [0:a]atempo=0.5, atempo=0.5[a]" \
  -map '[v]' -map '[a]' \
  possessed-doll.mp4
```

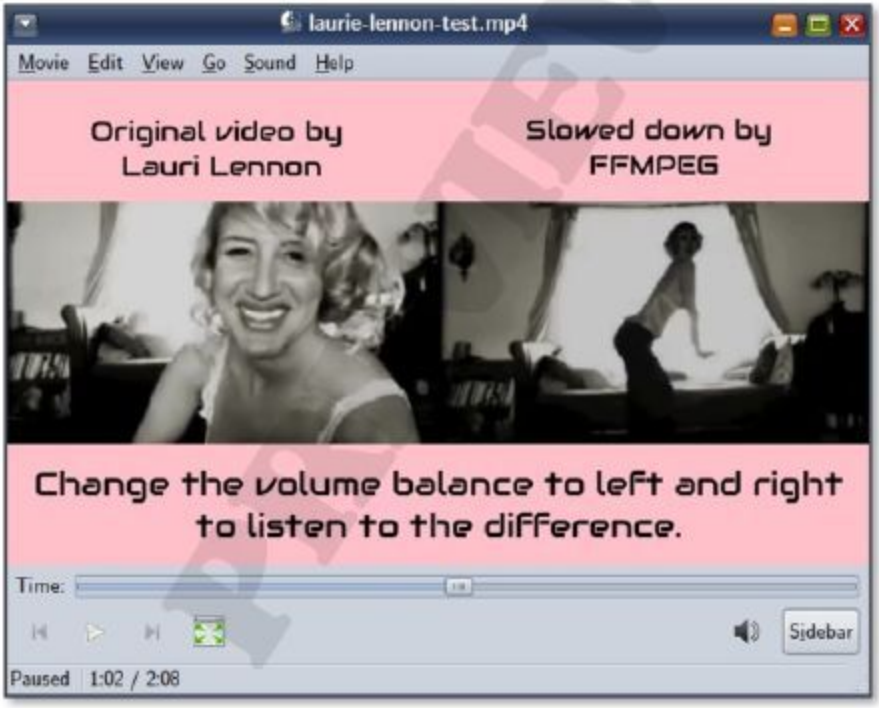
☞ Note the different multiples used for video and audio to achieve the same effect. The audio filter has been used twice because of the limitation in its range.

☞ Read previous section for more information on these two filters.

Laurie Lennon, from the Lennon Sisters family, has published a tribute video for

the *Merrie Melodies* number "Oh, Wolfie!". When I saw it for the first time some years ago, I felt the tempo was too high. I slowed the audio down in Audacity. (I have all songs featuring *Lou* as MP3 files, complete with Wolfie's and Droopy's crazy antics.) For my 2020 book, I tried to do the same using FFmpeg and apply the change to the video as well. My calculation became easier when I used seconds. The original video was 114 seconds and my slowed-down audio was 128 seconds.

```
# 128/114 and 114/128
ffmpeg -y -i Laurie-Lennon-Original.mp4 \
    -filter_complex \
    "[0:v]setpts=PTS*(128/114)[v];
     [0:a]atempo=(114/128)[a]" \
  -map '[v]' -map '[a]' \
  Laurie-Lennon-Slow.mp4
```



The links to these videos and those used in other examples in this book are available online:

> **http://www.vsubhash.in/ffmpeg-book.html**

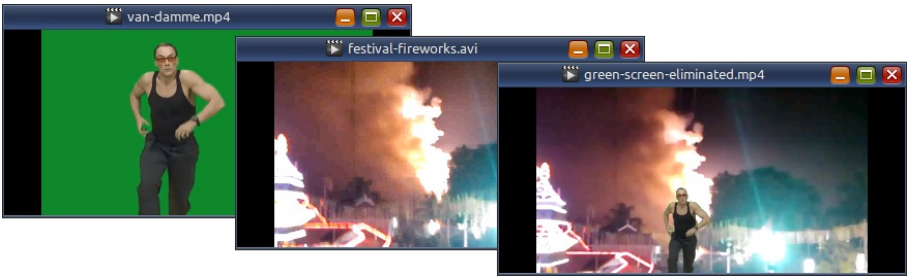


Figure 11-19: *The green-screen video has been rendered on the fireworks video.*

☞ Jean-Claude Van Damme produced and donated this green-screen video to the public.

Turn all colors gray except one

How do some commercials and music videos eliminate all colors except a few? With the `colorhold` filter!

```
ffmpeg -i color-test.mp4 \
       -filter:v "colorhold=yellow:similarity=0.2" \
       hold-yellow.mp4
```

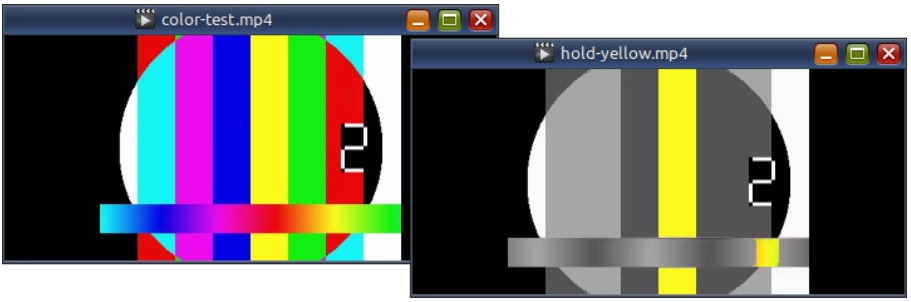


Figure 11-20: *Using the `colorhold` filter, all colors in the original video have been removed except yellow.*

How to pan across a video

Can you create the effect of a camera panning from top-left corner across to a particular region on the video? The next command tries to pan to a region that is 332x332 with the top-left coordinates at 150,12. The effect starts from the 20th second and lasts just 5 seconds. After the panning effect, this video can be concatenated to the rest of the cropped video.

```
ffmpeg -y -ss 20 -i how-to-vote.mp4 \
  -filter_complex \
      "[0:v:0]crop=w=332:h=332:
       x=(150*min(t\,5)/5):y=(12*min(t\,5)/5)" \
  -codec:a copy \
  how-to-vote-panned.mp4
```

In this command, the filter constant `t` representing the seconds is used to move the x-y coordinates of the crop region to its ultimate location at 150,12. For this, the coordinate is multiplied by `t` and divided by the total duration of the effect (5 seconds). The `min` function expires the offsets of the crop filter after it has reached the destination at the end of 5 seconds.

Using FFmpeg with timeline-based video-editing software

This tip comes from Apress author Seth Kenlon who mentioned it in his podcast some years ago. A lot of content creators record their videos in high-definition. Editing these videos is quite a hassle in timeline-based video editing software. His trick was to downsize the video to say qvga (320x240) and then import that smaller video into his video-editing software. Because the video was so small, the editing software was more responsive and he could finish the editing quickly. After he saved the project, he would close the editor. He would then manually overwrite the smaller video file with the original video. He would then start the editor again, open the project file and only render (export) the video.

Your video editor must have built-in support for this kind of proxy editing. If not, it is likely to suffer from synchronization and scaling issues. Alternatively, you could reduce the frame rate to 12. This can make quite a difference if the source was recorded at say 60.

Make `ffmpeg -version` more meaningful

If you had installed the pre-built ffmpeg executable and checked the `-version` option, `ffmpeg` displays the version like any other command-line program. If you build from source, then `ffmpeg` will display the label of the source code snapshot on the FFmpeg `git` repository.

```
~/Desktop
$ ffmpeg -version | head -1
ffmpeg version N-107964-g7de9c0e9d7 Copyright (c) 2000-2022
the FFmpeg developers
```

Figure 11-21: *This `git` label is likely to be meaningless to most users. Is `ffmpeg` trying to be anonymous?*

I studied the build script and made a few changes to one of the files extracted from the tarball (the downloaded compressed source code).

```
# Backup the file containing the git label
cp VERSION VERSION.bak

# Suffix the current date and release version number
# to the label
echo  -e \
 "$(cat VERSION.bak) [$(date +%Y-%m-%d)] [$(cat RELEASE)] " \
 > VERSION
```

Then, I ran the `make` and `make install` commands to build the binaries. Now, the

version number is more meaningful. If I have to deal with multiple ffmpeg binaries sometime in future, this information will be useful.

```
~/ffmpeg_sources/ffmpeg
$ ~/bin/ffmpeg -version | head -1
ffmpeg version N-108219-g129cbbd7be [2022-09-20] [5.1.git]
Copyright (c) 2000-2022 the FFmpeg developers
```

Figure 11-22: *The `-version` option displays the `git` label for whatever it is worth, YOUR build date and the number of the last release version.*

This of course assumes that you will build the binaries on the same day you downloaded the source.

Hardware acceleration

Computer video cards have encoders and decoders of some popular codecs in their chips. These hardware encoders and decoders are faster than the CPU running software-based encoders and decoders. You can offload the encoding and decoding operations of supported codecs from the processor (CPU) on your computer's motherboard to the processor chip (GPU) on your graphics card. (AMD calls 'em GPUs as APUs.)

What the heck is all that? Well, instead of encoding the video using your CPU with a software encoder like this:

```
ffmpeg -i raw-video.avi -codec:v libx264 compressed-video.mp4
```

... you can offload the processing to your video card like this:

```
# If you are on the red team
ffmpeg -i raw-video.avi -codec:v h264_amf compressed-video.mp4

# or

# if you are green with nv
ffmpeg -i raw-video.avi -codec:v h264_nvenc \
       compressed-video.mp4
```

Is that not cool? Well, to use such an exotic option, you need to build the FFmpeg source code forked by one of the participating video card manufacturers. You can find more information on this topic from:

- **https://docs.nvidia.com/video-technologies/video-codec-sdk/ffmpeg-with-nvidia-gpu/**
- **https://trac.ffmpeg.org/wiki/HWAccelIntro**

Beware that not all GPU models are supported. In some cases, performance may be inferior or have additional restrictions. nVidia seems to have shown more interest and openness in this field than AMD or Intel. I have AMD hardware and

could not find enough documentation to build from source.

It is better if you can get statically linked builds created by someone else. For Windows users, the builds provided by the reviewer on his website (**www.gyan.dev**) had support for hardware-accelerated encoders and decoders in AMD and nVidia GPUs.

```
~/Desktop
$ wine [redacted]/ffmpeg-dos/bin/ffmpeg.exe \
>   -encoders -hide_banner | grep 'amf\|nv'
 V....D h264_amf             AMD AMF H.264 Encoder (codec h264)
 V....D h264_nvenc           NVIDIA NVENC H.264 encoder (codec h264)
 V....D hevc_amf             AMD AMF HEVC encoder (codec hevc)
 V....D hevc_nvenc           NVIDIA NVENC hevc encoder (codec hevc)


~/Desktop
$ ffmpeg -encoders | grep vaapi
 V....D h264_vaapi           H.264/AVC (VAAPI) (codec h264)
 V....D hevc_vaapi           H.265/HEVC (VAAPI) (codec hevc)
 V....D mjpeg_vaapi          MJPEG (VAAPI) (codec mjpeg)
 V....D mpeg2_vaapi          MPEG-2 (VAAPI) (codec mpeg2video)
 V....D vp8_vaapi            VP8 (VAAPI) (codec vp8)
 V....D vp9_vaapi            VP9 (VAAPI) (codec vp9)
```

Figure 11-23: *Some hardware-accelerated encoders available in a Windows build and a Linux build have been listed.*

☞ No, `wine` will not work. I used it only to take this screenshot of the encoder listing.

☞ The `hevc` encoders are for the newer H265 codec. Try `ffmpeg -hwaccels` to see what hardware-accelerated options you have.

☞ The `libva` library (Video Acceleration API) is supported in some Intel and AMD GPUs.

Apart from encoders and decoders, you can install some hardware-accelerated filters when you build from source. [15]

```
~/Desktop
$ ffmpeg -filters | grep opencl
 ... avgblur_opencl     V->V       Apply average blur filter
 ... boxblur_opencl     V->V       Apply boxblur filter to in
 ... colorkey_opencl    V->V       Turns a certain color into
 ... convolution_opencl V->V        Apply convolution mask to
 ... deshake_opencl     V->V       Feature-point based video
 ... dilation_opencl    V->V       Apply dilation effect
```

Figure 11-24: *Several OpenCL-enabled filters were installed after adding the `--enable-opencl` option in the `configure` script when I built FFmpeg version 5.1 from source.*

Finis

All right! What does this command do?

```
ffmpeg \
 -f image2 -loop 1 -i BG-Collage.png \
 -f mp4 -i idiot-box-2.mp4 -i chenda-music-sound-levels.mp4 \
        -i Delphine-with-accessibility.mp4 \
        -i race-timer.mp4 -i slide.mp4 \
        -i watermarked-solar.mp4 \
  -filter_complex \
    "[0:v:0]drawtext=x=(w-tw)/2:y=15:
       fontcolor=red:alpha=0.6:shadowx=1:shadowy=2:
       text='Quick Start Guide To FFmpeg by V. Subhash':
       fontsize=30:fontfile=Oswald.ttf[banner1];
     [banner1]drawtext=x=(w-tw)/2:y=270:
       fontcolor=white:alpha=0.6:shadowx=1:shadowy=2:
       text='www.Apress.com':fontsize=30:
       fontfile=Merriweather.ttf[banner];
     [1:v:0]scale=160:90[scale1];
         [banner][scale1]overlay=40:60[over1];
     [2:v:0]scale=160:90[scale2];
         [over1][scale2]overlay=240:60[over2];
     [3:v:0]scale=160:90[scale3];
         [over2][scale3]overlay=440:60[over3];
     [4:v:0]scale=160:90[scale4];
         [over3][scale4]overlay=40:170[over4];
     [5:v:0]scale=160:90[scale5];
         [over4][scale5]overlay=240:170[over5];
     [6:v:0]scale=160:90[scale6];
         [over5][scale6]overlay=440:170[video];
 [1:a:0][2:a:0][3:a:0][4:a:0][6:a:0]amerge=inputs=5[audio]" \
  -map '[video]' -map '[audio]' \
  -ac 2 \
  -t 0:0:10 \
  thank-you.mp4
```

This command creates a video that has six downscaled videos playing simultaneously on a background image. The audio from the five input files were downmixed to stereo. (The slideshow had no audio.) Even the text on the background were rendered by `ffmpeg`.

Figure 11-25: *This video collage was created using several FFmpeg techniques described in this book.*

This video and several others used in this book are available in an online video playlist. You can find its link on these sites:

- **www.apress.com/9781484287002**
- **www.vsubhash.in/ffmpeg-book.html**

What next...

Well, you have finished the book. What else can you do?

- Check the extra resources [7] provided for this book.
- Spend some time reading the relevant sections of the FFmpeg documentation and online wiki when you are trying out the commands.
- If you have an FFmpeg-related problem, you may be able to find answers by simply doing an online search of its error message (within quotation marks). When you post FFmpeg-related questions on a forum, post the error messages as text rather than as screenshots.
    - **https://superuser.com/questions/tagged/ffmpeg**
    - **https://video.stackexchange.com/questions/tagged/ffmpeg**
- If FFmpeg made a valuable contribution to you or your organization, you could show your appreciation of the favor: **http://ffmpeg.org/donations.html**
- If you give this book a good rating (☆ ☆ ☆ ☆ ☆) or review online, that will also be appreciated... by me... and other current/future FFmpeg users.
- If you have any corrections or suggestions, write to: **info@vsubhash.com**

ANNEXURE 1:
Sample list of codecs

This annexure contains sample output for the command `ffmpeg -codecs`.

```
Codecs:
D..... = Decoding supported
.E.... = Encoding supported
..V... = Video codec
..A... = Audio codec
..S... = Subtitle codec
..D... = Data codec
..T... = Attachment codec
...I.. = Intra frame-only codec
....L. = Lossy compression
.....S = Lossless compression
-------
D.VI.S 012v                 Uncompressed 4:2:2 10-bit
D.V.L. 4xm                  4X Movie
D.VI.S 8bps                 QuickTime 8BPS video
.EVIL. a64_multi            Multicolor charset for Commodore 64 (encoder
                             ↳ s: a64multi)
.EVIL. a64_multi5           Multicolor charset for Commodore 64, extende
                             ↳ d with 5th color (colram) (encoders: a64mu
                             ↳ lti5)
D.V..S aasc                 Autodesk RLE
D.V.L. agm                  Amuse Graphics Movie
D.VIL. aic                  Apple Intermediate Codec
DEVI.S alias_pix            Alias/Wavefront PIX image
DEVIL. amv                  AMV Video
D.V.L. anm                  Deluxe Paint Animation
D.V.L. ansi                 ASCII/ANSI art
DEV..S apng                 APNG (Animated Portable Network Graphics) im
                             ↳ age
D.V.L. arbc                 Gryphon's Anim Compressor
D.V.L. argo                 Argonaut Games Video
DEVIL. asv1                 ASUS V1
DEVIL. asv2                 ASUS V2
D.VIL. aura                 Auravision AURA
D.VIL. aura2                Auravision Aura 2
DEV.L. av1                  Alliance for Open Media AV1 (decoders: libda
                             ↳ v1d libaom-av1 av1 ) (encoders: libaom-av1
                             ↳  libsvtav1)
D.V... avrn                 Avid AVI Codec
DEVI.S avrp                 Avid 1:1 10-bit RGB Packer
D.V.L. avs                  AVS (Audio Video Standard) video
..V.L. avs2                 AVS2-P2/IEEE1857.4
..V.L. avs3                 AVS3-P2/IEEE1857.10
DEVI.S avui                 Avid Meridien Uncompressed
DEVI.S ayuv                 Uncompressed packed MS 4:4:4:4
D.V.L. bethsoftvid          Bethesda VID video
D.V.L. bfi                  Brute Force & Ignorance
```

```
D.V.L. binkvideo           Bink video
D.VI.. bintext             Binary text
DEVI.S bitpacked           Bitpacked
DEVI.S bmp                 BMP (Windows and OS/2 bitmap)
D.V..S bmv_video           Discworld II BMV video
D.VI.S brender_pix         BRender PIX image
D.V.L. c93                 Interplay C93
D.V.L. cavs                Chinese AVS (Audio Video Standard) (AVS1-P2,
                            ↳  JiZhun profile)
D.V.L. cdgraphics          CD Graphics video
D.V..S cdtoons             CDToons video
D.VIL. cdxl                Commodore CDXL video
DEV.L. cfhd                GoPro CineForm HD
DEV.L. cinepak             Cinepak
D.V.L. clearvideo          Iterated Systems ClearVideo
DEVIL. cljr                Cirrus Logic AccuPak
D.VI.S cllc                Canopus Lossless Codec
D.V.L. cmv                 Electronic Arts CMV video (decoders: eacmv)
D.V... cpia                CPiA video format
D.VILS cri                 Cintel RAW
D.V..S cscd                CamStudio (decoders: camstudio)
D.VIL. cyuv                Creative YUV (CYUV)
..V.LS daala               Daala
D.VILS dds                 DirectDraw Surface image decoder
D.V.L. dfa                 Chronomaster DFA
DEV.LS dirac               Dirac (encoders: vc2)
DEVIL. dnxhd               VC3/DNxHD
DEVI.S dpx                 DPX (Digital Picture Exchange) image
D.V.L. dsicinvideo         Delphine Software International CIN video
DEVIL. dvvideo             DV (Digital Video)
D.V..S dxa                 Feeble Files/ScummVM DXA
D.VI.S dxtory              Dxtory
D.VIL. dxv                 Resolume DXV
D.V.L. escape124           Escape 124
D.V.L. escape130           Escape 130
DEVILS exr                 OpenEXR image
DEV..S ffv1                FFmpeg video codec #1
DEVI.S ffvhuff             Huffyuv FFmpeg variant
D.V.L. fic                 Mirillis FIC
DEVI.S fits                FITS (Flexible Image Transport System)
DEV..S flashsv             Flash Screen Video v1
DEV.L. flashsv2            Flash Screen Video v2
D.V..S flic                Autodesk Animator Flic video
DEV.L. flv1                FLV / Sorenson Spark / Sorenson H.263 (Flash
                            ↳  Video) (decoders: flv ) (encoders: flv)
D.V..S fmvc                FM Screen Capture Codec
D.VI.S fraps               Fraps
D.VI.S frwu                Forward Uncompressed
D.V.L. g2m                 Go2Meeting
D.V.L. gdv                 Gremlin Digital Video
D.V.L. gem                 GEM Raster image
DEV..S gif                 CompuServe GIF (Graphics Interchange Format)
DEV.L. h261                H.261
DEV.L. h263                H.263 / H.263-1996, H.263+ / H.263-1998 / H.
                            ↳ 263 version 2 (decoders: h263 h263_v4l2m2m
                            ↳  ) (encoders: h263 h263_v4l2m2m)
D.V.L. h263i               Intel H.263
DEV.L. h263p               H.263+ / H.263-1998 / H.263 version 2
DEV.LS h264                H.264 / AVC / MPEG-4 AVC / MPEG-4 part 10 (d
                            ↳ ecoders: h264 h264_v4l2m2m ) (encoders: li
                            ↳ bx264 libx264rgb h264_v4l2m2m h264_vaapi)
DEVIL. hap                 Vidvox Hap
DEVIL. hdr                 HDR (Radiance RGBE format) image
```

```
DEV.L. hevc                 H.265 / HEVC (High Efficiency Video Coding)
                             ↳ (decoders: hevc hevc_v4l2m2m ) (encoders:
                             ↳ libx265 hevc_v4l2m2m hevc_vaapi)
D.V.L. hnm4video            HNM 4 video
D.VIL. hq_hqa               Canopus HQ/HQA
D.VIL. hqx                  Canopus HQX
DEVI.S huffyuv              HuffYUV
D.VI.S hymt                 HuffYUV MT
D.V.L. idcin                id Quake II CIN video (decoders: idcinvideo)
D.VI.. idf                  iCEDraw text
D.V.L. iff_ilbm             IFF ACBM/ANIM/DEEP/ILBM/PBM/RGB8/RGBN (decod
                             ↳ ers: iff)
D.V.L. imm4                 Infinity IMM4
D.V.L. imm5                 Infinity IMM5
D.V.L. indeo2               Intel Indeo 2
D.V.L. indeo3               Intel Indeo 3
D.V.L. indeo4               Intel Indeo Video Interactive 4
D.V.L. indeo5               Intel Indeo Video Interactive 5
D.V.L. interplayvideo       Interplay MVE video
D.VIL. ipu                  IPU Video
DEVILS jpeg2000             JPEG 2000 (decoders: jpeg2000 libopenjpeg )
                             ↳ (encoders: jpeg2000 libopenjpeg)
DEVILS jpegls               JPEG-LS
DEVILS jpegxl               JPEG XL (decoders: libjxl ) (encoders: libjx
                             ↳ l)
D.VIL. jv                   Bitmap Brothers JV video
D.V.L. kgv1                 Kega Game Video
D.V.L. kmvc                 Karl Morton's video codec
D.VI.S lagarith             Lagarith lossless
.EVI.S ljpeg                Lossless JPEG
D.VI.S loco                 LOCO
D.V.L. lscr                 LEAD Screen Capture
D.VI.S m101                 Matrox Uncompressed SD
D.V.L. mad                  Electronic Arts Madcow Video (decoders: eama
                             ↳ d)
DEVI.S magicyuv             MagicYUV video
D.VIL. mdec                 Sony PlayStation MDEC (Motion DECoder)
D.V.L. mimic                Mimic
DEVIL. mjpeg                Motion JPEG (encoders: mjpeg mjpeg_vaapi)
D.VIL. mjpegb               Apple MJPEG-B
D.V.L. mmvideo              American Laser Games MM Video
D.V.L. mobiclip             MobiClip Video
D.V.L. motionpixels         Motion Pixels video
DEV.L. mpeg1video           MPEG-1 video (decoders: mpeg1video mpeg1_v4l
                             ↳ 2m2m)
DEV.L. mpeg2video           MPEG-2 video (decoders: mpeg2video mpegvideo
                             ↳  mpeg2_v4l2m2m ) (encoders: mpeg2video mpe
                             ↳ g2_vaapi)
DEV.L. mpeg4                MPEG-4 part 2 (decoders: mpeg4 mpeg4_v4l2m2m
                             ↳  ) (encoders: mpeg4 libxvid mpeg4_v4l2m2m)
D.V.L. msa1                 MS ATC Screen
D.VI.S mscc                 Mandsoft Screen Capture Codec
D.V.L. msmpeg4v1            MPEG-4 part 2 Microsoft variant version 1
DEV.L. msmpeg4v2            MPEG-4 part 2 Microsoft variant version 2
DEV.L. msmpeg4v3            MPEG-4 part 2 Microsoft variant version 3 (d
                             ↳ ecoders: msmpeg4 ) (encoders: msmpeg4)
D.VI.S msp2                 Microsoft Paint (MSP) version 2
D.V..S msrle                Microsoft RLE
D.V.L. mss1                 MS Screen 1
D.VIL. mss2                 MS Windows Media Video V9 Screen
DEV.L. msvideo1             Microsoft Video 1
D.VI.S mszh                 LCL (LossLess Codec Library) MSZH
D.V.L. mts2                 MS Expression Encoder Screen
```

```
D.V.L. mv30                 MidiVid 3.0
D.VIL. mvc1                 Silicon Graphics Motion Video Compressor 1
D.VIL. mvc2                 Silicon Graphics Motion Video Compressor 2
D.V.L. mvdv                 MidiVid VQ
D.VIL. mvha                 MidiVid Archive Codec
D.V..S mwsc                 MatchWare Screen Capture Codec
D.V.L. mxpeg                Mobotix MxPEG video
D.VIL. notchlc              NotchLC
D.V.L. nuv                  NuppelVideo/RTJPEG
D.V.L. paf_video            Amazing Studio Packed Animation File Video
DEVI.S pam                  PAM (Portable AnyMap) image
DEVI.S pbm                  PBM (Portable BitMap) image
DEVI.S pcx                  PC Paintbrush PCX image
DEVI.S pfm                  PFM (Portable FloatMap) image
DEVI.S pgm                  PGM (Portable GrayMap) image
DEVI.S pgmyuv               PGMYUV (Portable GrayMap YUV) image
D.VI.S pgx                  PGX (JPEG2000 Test Format)
DEVI.S phm                  PHM (Portable HalfFloatMap) image
D.V.L. photocd              Kodak Photo CD
D.VIL. pictor               Pictor/PC Paint
D.VIL. pixlet               Apple Pixlet
DEV..S png                  PNG (Portable Network Graphics) image
DEVI.S ppm                  PPM (Portable PixelMap) image
DEVIL. prores               Apple ProRes (iCodec Pro) (encoders: prores
                             ↳ prores_aw prores_ks)
D.VIL. prosumer             Brooktree ProSumer Video
D.VI.S psd                  Photoshop PSD file
D.VIL. ptx                  V.Flash PTX image
D.VI.S qdraw                Apple QuickDraw
DEVI.S qoi                  QOI (Quite OK Image)
D.V.L. qpeg                 Q-team QPEG
DEV..S qtrle                QuickTime Animation (RLE) video
DEVI.S r10k                 AJA Kona 10-bit RGB Codec
DEVI.S r210                 Uncompressed RGB 10-bit
D.V.L. rasc                 RemotelyAnywhere Screen Capture
DEVI.S rawvideo             raw video
D.VIL. rl2                  RL2 video
DEV.L. roq                  id RoQ video (decoders: roqvideo ) (encoders
                             ↳ : roqvideo)
DEV.L. rpza                 QuickTime video (RPZA)
D.V..S rscc                 innoHeim/Rsupport Screen Capture Codec
DEV.L. rv10                 RealVideo 1.0
DEV.L. rv20                 RealVideo 2.0
D.V.L. rv30                 RealVideo 3.0
D.V.L. rv40                 RealVideo 4.0
D.V.L. sanm                 LucasArts SANM/SMUSH video
D.V.LS scpr                 ScreenPressor
D.V..S screenpresso         Screenpresso
D.V.L. sga                  Digital Pictures SGA Video
DEVI.S sgi                  SGI image
D.VI.S sgirle               SGI RLE 8-bit
D.VI.S sheervideo           BitJazz SheerVideo
D.V.L. simbiosis_imx        Simbiosis Interactive IMX Video
D.V.L. smackvideo           Smacker video (decoders: smackvid)
DEV.L. smc                  QuickTime Graphics (SMC)
D.VIL. smvjpeg              Sigmatel Motion Video
DEV.LS snow                 Snow
D.VIL. sp5x                 Sunplus JPEG (SP5X)
DEVIL. speedhq              NewTek SpeedHQ
D.VI.S srgc                 Screen Recorder Gold Codec
DEVI.S sunrast              Sun Rasterfile image
..V..S svg                  Scalable Vector Graphics
DEV.L. svq1                 Sorenson Vector Quantizer 1 / Sorenson Video
```

```
                          ↳  1 / SVQ1
D.V.L. svq3               Sorenson Vector Quantizer 3 / Sorenson Video
                          ↳  3 / SVQ3
DEVI.S targa              Truevision Targa image
D.VI.S targa_y216         Pinnacle TARGA CineWave YUV16
D.V.L. tdsc               TDSC
D.V.L. tgq                Electronic Arts TGQ video (decoders: eatgq)
D.V.L. tgv                Electronic Arts TGV video (decoders: eatgv)
DEV.L. theora             Theora (encoders: libtheora)
D.VIL. thp                Nintendo Gamecube THP video
D.V.L. tiertexseqvideo    Tiertex Limited SEQ video
DEVI.S tiff               TIFF image
D.VIL. tmv                8088flex TMV
D.V.L. tqi                Electronic Arts TQI video (decoders: eatqi)
D.V.L. truemotion1        Duck TrueMotion 1.0
D.V.L. truemotion2        Duck TrueMotion 2.0
D.VIL. truemotion2rt      Duck TrueMotion 2.0 Real Time
D.V..S tscc               TechSmith Screen Capture Codec (decoders: ca
                          ↳ mtasia)
D.V.L. tscc2              TechSmith Screen Codec 2
D.VIL. txd                Renderware TXD (TeXture Dictionary) image
D.V.L. ulti               IBM UltiMotion (decoders: ultimotion)
DEVI.S utvideo            Ut Video
DEVI.S v210               Uncompressed 4:2:2 10-bit
D.VI.S v210x              Uncompressed 4:2:2 10-bit
DEVI.S v308               Uncompressed packed 4:4:4
DEVI.S v408               Uncompressed packed QT 4:4:4:4
DEVI.S v410               Uncompressed 4:4:4 10-bit
D.V.L. vb                 Beam Software VB
D.VI.S vble               VBLE Lossless Codec
DEV.L. vbn                Vizrt Binary Image
D.V.L. vc1                SMPTE VC-1 (decoders: vc1 vc1_v4l2m2m)
D.V.L. vc1image           Windows Media Video 9 Image v2
D.VIL. vcr1               ATI VCR1
D.VIL. vixl               Miro VideoXL (decoders: xl)
D.V.L. vmdvideo           Sierra VMD video
D.V..S vmnc               VMware Screen Codec / VMware Video
D.V.L. vp3                On2 VP3
D.V.L. vp4                On2 VP4
D.V.L. vp5                On2 VP5
D.V.L. vp6                On2 VP6
D.V.L. vp6a               On2 VP6 (Flash version, with alpha channel)
D.V.L. vp6f               On2 VP6 (Flash version)
D.V.L. vp7                On2 VP7
DEV.L. vp8                On2 VP8 (decoders: vp8 vp8_v4l2m2m libvpx )
                          ↳ (encoders: libvpx vp8_v4l2m2m vp8_vaapi)
DEV.L. vp9                Google VP9 (decoders: vp9 vp9_v4l2m2m libvpx
                          ↳ -vp9 ) (encoders: libvpx-vp9 vp9_vaapi)
..V.L. vvc                H.266 / VVC (Versatile Video Coding)
DEVI.S wbmp               WBMP (Wireless Application Protocol Bitmap)
                          ↳ image
D.V..S wcmv               WinCAM Motion Video
DEVILS webp               WebP (encoders: libwebp_anim libwebp)
DEV.L. wmv1               Windows Media Video 7
DEV.L. wmv2               Windows Media Video 8
D.V.L. wmv3               Windows Media Video 9
D.V.L. wmv3image          Windows Media Video 9 Image
D.VIL. wnv1               Winnov WNV1
DEV..S wrapped_avframe    AVFrame to AVPacket passthrough
D.V.L. ws_vqa             Westwood Studios VQA (Vector Quantized Anima
                          ↳ tion) video (decoders: vqavideo)
D.V.L. xan_wc3            Wing Commander III / Xan
D.V.L. xan_wc4            Wing Commander IV / Xxan
```

```
D.VI.. xbin                 eXtended BINary text
DEVI.S xbm                  XBM (X BitMap) image
DEVIL. xface                X-face image
D.VI.S xpm                  XPM (X PixMap) image
DEVI.S xwd                  XWD (X Window Dump) image
DEVI.S y41p                 Uncompressed YUV 4:1:1 12-bit
D.VI.S ylc                  YUY2 Lossless Codec
D.V.L. yop                  Psygnosis YOP Video
DEVI.S yuv4                 Uncompressed packed 4:2:0
D.V..S zerocodec            ZeroCodec Lossless Video
DEVI.S zlib                 LCL (LossLess Codec Library) ZLIB
DEV..S zmbv                 Zip Motion Blocks Video
..AIL. 4gv                  4GV (Fourth Generation Vocoder)
D.AIL. 8svx_exp             8SVX exponential
D.AIL. 8svx_fib             8SVX fibonacci
DEAIL. aac                  AAC (Advanced Audio Coding) (decoders: aac a
                             ↳ ac_fixed libfdk_aac ) (encoders: aac libfd
                             ↳ k_aac)
D.AIL. aac_latm             AAC LATM (Advanced Audio Coding LATM syntax)
DEAIL. ac3                  ATSC A/52A (AC-3) (decoders: ac3 ac3_fixed )
                             ↳  (encoders: ac3 ac3_fixed)
D.AIL. acelp.kelvin         Sipro ACELP.KELVIN
D.AIL. adpcm_4xm            ADPCM 4X Movie
DEAIL. adpcm_adx            SEGA CRI ADX ADPCM
D.AIL. adpcm_afc            ADPCM Nintendo Gamecube AFC
D.AIL. adpcm_agm            ADPCM AmuseGraphics Movie AGM
D.AIL. adpcm_aica           ADPCM Yamaha AICA
DEAIL. adpcm_argo           ADPCM Argonaut Games
D.AIL. adpcm_ct             ADPCM Creative Technology
D.AIL. adpcm_dtk            ADPCM Nintendo Gamecube DTK
D.AIL. adpcm_ea             ADPCM Electronic Arts
D.AIL. adpcm_ea_maxis_xa    ADPCM Electronic Arts Maxis CDROM XA
D.AIL. adpcm_ea_r1          ADPCM Electronic Arts R1
D.AIL. adpcm_ea_r2          ADPCM Electronic Arts R2
D.AIL. adpcm_ea_r3          ADPCM Electronic Arts R3
D.AIL. adpcm_ea_xas         ADPCM Electronic Arts XAS
DEAIL. adpcm_g722           G.722 ADPCM (decoders: g722 ) (encoders: g72
                             ↳ 2)
DEAIL. adpcm_g726           G.726 ADPCM (decoders: g726 ) (encoders: g72
                             ↳ 6)
DEAIL. adpcm_g726le         G.726 ADPCM little-endian (decoders: g726le
                             ↳ ) (encoders: g726le)
D.AIL. adpcm_ima_acorn      ADPCM IMA Acorn Replay
DEAIL. adpcm_ima_alp        ADPCM IMA High Voltage Software ALP
DEAIL. adpcm_ima_amv        ADPCM IMA AMV
D.AIL. adpcm_ima_apc        ADPCM IMA CRYO APC
DEAIL. adpcm_ima_apm        ADPCM IMA Ubisoft APM
D.AIL. adpcm_ima_cunning    ADPCM IMA Cunning Developments
D.AIL. adpcm_ima_dat4       ADPCM IMA Eurocom DAT4
D.AIL. adpcm_ima_dk3        ADPCM IMA Duck DK3
D.AIL. adpcm_ima_dk4        ADPCM IMA Duck DK4
D.AIL. adpcm_ima_ea_eacs    ADPCM IMA Electronic Arts EACS
D.AIL. adpcm_ima_ea_sead    ADPCM IMA Electronic Arts SEAD
D.AIL. adpcm_ima_iss        ADPCM IMA Funcom ISS
D.AIL. adpcm_ima_moflex     ADPCM IMA MobiClip MOFLEX
D.AIL. adpcm_ima_mtf        ADPCM IMA Capcom's MT Framework
D.AIL. adpcm_ima_oki        ADPCM IMA Dialogic OKI
DEAIL. adpcm_ima_qt         ADPCM IMA QuickTime
D.AIL. adpcm_ima_rad        ADPCM IMA Radical
D.AIL. adpcm_ima_smjpeg     ADPCM IMA Loki SDL MJPEG
DEAIL. adpcm_ima_ssi        ADPCM IMA Simon & Schuster Interactive
DEAIL. adpcm_ima_wav        ADPCM IMA WAV
DEAIL. adpcm_ima_ws         ADPCM IMA Westwood
```

```
DEAIL. adpcm_ms             ADPCM Microsoft
D.AIL. adpcm_mtaf           ADPCM MTAF
D.AIL. adpcm_psx            ADPCM Playstation
D.AIL. adpcm_sbpro_2        ADPCM Sound Blaster Pro 2-bit
D.AIL. adpcm_sbpro_3        ADPCM Sound Blaster Pro 2.6-bit
D.AIL. adpcm_sbpro_4        ADPCM Sound Blaster Pro 4-bit
DEAIL. adpcm_swf            ADPCM Shockwave Flash
D.AIL. adpcm_thp            ADPCM Nintendo THP
D.AIL. adpcm_thp_le         ADPCM Nintendo THP (Little-Endian)
D.AIL. adpcm_vima           LucasArts VIMA audio
D.AIL. adpcm_xa             ADPCM CDROM XA
DEAIL. adpcm_yamaha         ADPCM Yamaha
D.AIL. adpcm_zork           ADPCM Zork
DEAI.S alac                 ALAC (Apple Lossless Audio Codec)
DEAIL. amr_nb               AMR-NB (Adaptive Multi-Rate NarrowBand) (dec
                             ↳ oders: amrnb libopencore_amrnb ) (encoders
                             ↳ : libopencore_amrnb)
DEAIL. amr_wb               AMR-WB (Adaptive Multi-Rate WideBand) (decod
                             ↳ ers: amrwb libopencore_amrwb ) (encoders:
                             ↳ libvo_amrwbenc)
D.AI.S ape                  Monkey's Audio
DEAIL. aptx                 aptX (Audio Processing Technology for Blueto
                             ↳ oth)
DEAIL. aptx_hd              aptX HD (Audio Processing Technology for Blu
                             ↳ etooth)
D.AIL. atrac1               ATRAC1 (Adaptive TRansform Acoustic Coding)
D.AIL. atrac3               ATRAC3 (Adaptive TRansform Acoustic Coding 3
                             ↳ )
D.AI.S atrac3al             ATRAC3 AL (Adaptive TRansform Acoustic Codin
                             ↳ g 3 Advanced Lossless)
D.AIL. atrac3p              ATRAC3+ (Adaptive TRansform Acoustic Coding
                             ↳ 3+) (decoders: atrac3plus)
D.AI.S atrac3pal            ATRAC3+ AL (Adaptive TRansform Acoustic Codi
                             ↳ ng 3+ Advanced Lossless) (decoders: atrac3
                             ↳ plusal)
D.AIL. atrac9               ATRAC9 (Adaptive TRansform Acoustic Coding 9
                             ↳ )
D.AIL. avc                  On2 Audio for Video Codec (decoders: on2avc)
D.AIL. binkaudio_dct        Bink Audio (DCT)
D.AIL. binkaudio_rdft       Bink Audio (RDFT)
D.AIL. bmv_audio            Discworld II BMV audio
..AIL. celt                 Constrained Energy Lapped Transform (CELT)
..AIL. codec2               codec2 (very low bitrate speech codec)
DEAIL. comfortnoise         RFC 3389 Comfort Noise
D.AIL. cook                 Cook / Cooker / Gecko (RealAudio G2)
D.AIL. derf_dpcm            DPCM Xilam DERF
DEA.L. dfpwm                DFPWM (Dynamic Filter Pulse Width Modulation
                             ↳ )
D.AIL. dolby_e              Dolby E
D.AIL. dsd_lsbf             DSD (Direct Stream Digital), least significa
                             ↳ nt bit first
D.AIL. dsd_lsbf_planar      DSD (Direct Stream Digital), least significa
                             ↳ nt bit first, planar
D.AIL. dsd_msbf             DSD (Direct Stream Digital), most significan
                             ↳ t bit first
D.AIL. dsd_msbf_planar      DSD (Direct Stream Digital), most significan
                             ↳ t bit first, planar
D.AIL. dsicinaudio          Delphine Software International CIN audio
D.AIL. dss_sp               Digital Speech Standard - Standard Play mode
                             ↳  (DSS SP)
D.AI.S dst                  DST (Direct Stream Transfer)
DEAILS dts                  DCA (DTS Coherent Acoustics) (decoders: dca
                             ↳ ) (encoders: dca)
```

```
D.AIL. dvaudio              DV audio
DEAIL. eac3                 ATSC A/52B (AC-3, E-AC-3)
D.AIL. evrc                 EVRC (Enhanced Variable Rate Codec)
D.AIL. fastaudio            MobiClip FastAudio
DEAI.S flac                 FLAC (Free Lossless Audio Codec)
DEAIL. g723_1               G.723.1
D.AIL. g729                 G.729
D.AIL. gremlin_dpcm         DPCM Gremlin
D.AIL. gsm                  GSM
D.AIL. gsm_ms               GSM Microsoft variant
D.AIL. hca                  CRI HCA
D.AIL. hcom                 HCOM Audio
D.AIL. iac                  IAC (Indeo Audio Coder)
D.AIL. ilbc                 iLBC (Internet Low Bitrate Codec)
D.AIL. imc                  IMC (Intel Music Coder)
D.AIL. interplay_dpcm       DPCM Interplay
D.AIL. interplayacm         Interplay ACM
D.AIL. mace3                MACE (Macintosh Audio Compression/Expansion)
                             ↳  3:1
D.AIL. mace6                MACE (Macintosh Audio Compression/Expansion)
                             ↳  6:1
D.AIL. metasound            Voxware MetaSound
DEA..S mlp                  MLP (Meridian Lossless Packing)
D.AIL. mp1                  MP1 (MPEG audio layer 1) (decoders: mp1 mp1f
                             ↳ loat)
DEAIL. mp2                  MP2 (MPEG audio layer 2) (decoders: mp2 mp2f
                             ↳ loat ) (encoders: mp2 mp2fixed libtwolame)
DEAIL. mp3                  MP3 (MPEG audio layer 3) (decoders: mp3float
                             ↳  mp3 ) (encoders: libmp3lame libshine)
D.AIL. mp3adu               ADU (Application Data Unit) MP3 (MPEG audio
                             ↳ layer 3) (decoders: mp3adufloat mp3adu)
D.AIL. mp3on4               MP3onMP4 (decoders: mp3on4float mp3on4)
D.AI.S mp4als               MPEG-4 Audio Lossless Coding (ALS) (decoders
                             ↳ : als)
..A.L. mpegh_3d_audio       MPEG-H 3D Audio
D.AIL. msnsiren             MSN Siren
D.AIL. musepack7            Musepack SV7 (decoders: mpc7)
D.AIL. musepack8            Musepack SV8 (decoders: mpc8)
DEAIL. nellymoser           Nellymoser Asao
DEAIL. opus                 Opus (Opus Interactive Audio Codec) (decoder
                             ↳ s: opus libopus ) (encoders: opus libopus)
D.AIL. paf_audio            Amazing Studio Packed Animation File Audio
DEAIL. pcm_alaw             PCM A-law / G.711 A-law
DEAI.S pcm_bluray           PCM signed 16|20|24-bit big-endian for Blu-r
                             ↳ ay media
DEAI.S pcm_dvd              PCM signed 20|24-bit big-endian
D.AI.S pcm_f16le            PCM 16.8 floating point little-endian
D.AI.S pcm_f24le            PCM 24.0 floating point little-endian
DEAI.S pcm_f32be            PCM 32-bit floating point big-endian
DEAI.S pcm_f32le            PCM 32-bit floating point little-endian
DEAI.S pcm_f64be            PCM 64-bit floating point big-endian
DEAI.S pcm_f64le            PCM 64-bit floating point little-endian
D.AI.S pcm_lxf              PCM signed 20-bit little-endian planar
DEAIL. pcm_mulaw            PCM mu-law / G.711 mu-law
DEAI.S pcm_s16be            PCM signed 16-bit big-endian
DEAI.S pcm_s16be_planar     PCM signed 16-bit big-endian planar
DEAI.S pcm_s16le            PCM signed 16-bit little-endian
DEAI.S pcm_s16le_planar     PCM signed 16-bit little-endian planar
DEAI.S pcm_s24be            PCM signed 24-bit big-endian
DEAI.S pcm_s24daud          PCM D-Cinema audio signed 24-bit
DEAI.S pcm_s24le            PCM signed 24-bit little-endian
DEAI.S pcm_s24le_planar     PCM signed 24-bit little-endian planar
DEAI.S pcm_s32be            PCM signed 32-bit big-endian
```

```
 DEAI.S pcm_s32le            PCM signed 32-bit little-endian
 DEAI.S pcm_s32le_planar     PCM signed 32-bit little-endian planar
 DEAI.S pcm_s64be            PCM signed 64-bit big-endian
 DEAI.S pcm_s64le            PCM signed 64-bit little-endian
 DEAI.S pcm_s8               PCM signed 8-bit
 DEAI.S pcm_s8_planar        PCM signed 8-bit planar
 D.AI.S pcm_sga              PCM SGA
 DEAI.S pcm_u16be            PCM unsigned 16-bit big-endian
 DEAI.S pcm_u16le            PCM unsigned 16-bit little-endian
 DEAI.S pcm_u24be            PCM unsigned 24-bit big-endian
 DEAI.S pcm_u24le            PCM unsigned 24-bit little-endian
 DEAI.S pcm_u32be            PCM unsigned 32-bit big-endian
 DEAI.S pcm_u32le            PCM unsigned 32-bit little-endian
 DEAI.S pcm_u8               PCM unsigned 8-bit
 DEAIL. pcm_vidc             PCM Archimedes VIDC
 D.AIL. qcelp                QCELP / PureVoice
 D.AIL. qdm2                 QDesign Music Codec 2
 D.AIL. qdmc                 QDesign Music
 DEAIL. ra_144               RealAudio 1.0 (14.4K) (decoders: real_144 )
                              ↳ (encoders: real_144)
 D.AIL. ra_288               RealAudio 2.0 (28.8K) (decoders: real_288)
 D.AI.S ralf                 RealAudio Lossless
 DEAIL. roq_dpcm             DPCM id RoQ
 DEAI.S s302m                SMPTE 302M
 DEAIL. sbc                  SBC (low-complexity subband codec)
 D.AIL. sdx2_dpcm            DPCM Squareroot-Delta-Exact
 D.AI.S shorten              Shorten
 D.AIL. sipr                 RealAudio SIPR / ACELP.NET
 D.AIL. siren                Siren
 D.AIL. smackaudio           Smacker audio (decoders: smackaud)
 ..AIL. smv                  SMV (Selectable Mode Vocoder)
 D.AIL. sol_dpcm             DPCM Sol
 DEAI.. sonic                Sonic
 .EAI.. sonicls              Sonic lossless
 DEAIL. speex                Speex (decoders: speex libspeex ) (encoders:
                              ↳  libspeex)
 D.A..S tak                  TAK (Tom's lossless Audio Kompressor)
 DEA..S truehd               TrueHD
 D.AIL. truespeech           DSP Group TrueSpeech
 DEAI.S tta                  TTA (True Audio)
 D.AIL. twinvq               VQF TwinVQ
 D.AIL. vmdaudio             Sierra VMD audio
 DEAIL. vorbis               Vorbis (decoders: vorbis libvorbis ) (encode
                              ↳ rs: vorbis libvorbis)
 D.AI.. wavesynth            Wave synthesis pseudo-codec
 DEAILS wavpack              WavPack
 D.AIL. westwood_snd1        Westwood Audio (SND1) (decoders: ws_snd1)
 D.AI.S wmalossless          Windows Media Audio Lossless
 D.AIL. wmapro               Windows Media Audio 9 Professional
 DEAIL. wmav1                Windows Media Audio 1
 DEAIL. wmav2                Windows Media Audio 2
 D.AIL. wmavoice             Windows Media Audio Voice
 D.AIL. xan_dpcm             DPCM Xan
 D.AIL. xma1                 Xbox Media Audio 1
 D.AIL. xma2                 Xbox Media Audio 2
 ..D... bin_data             binary data
 ..D... dvd_nav_packet       DVD Nav packet
 ..D... epg                  Electronic Program Guide
 ..D... klv                  SMPTE 336M Key-Length-Value (KLV) metadata
 ..D... mpegts               raw MPEG-TS stream
 ..D... otf                  OpenType font
 ..D... scte_35              SCTE 35 Message Queue
 ..D... timed_id3            timed ID3 metadata
```

```
 ..D... ttf                  TrueType font
 ..S... arib_caption         ARIB STD-B24 caption
 DES... ass                  ASS (Advanced SSA) subtitle (decoders: ssa a
                              ↳ ss ) (encoders: ssa ass)
 DES... dvb_subtitle         DVB subtitles (decoders: dvbsub ) (encoders:
                              ↳  dvbsub)
 D.S... dvb_teletext         DVB teletext (decoders: libzvbi_teletextdec
                              ↳ )
 DES... dvd_subtitle         DVD subtitles (decoders: dvdsub ) (encoders:
                              ↳  dvdsub)
 D.S... eia_608              EIA-608 closed captions (decoders: cc_dec)
 D.S... hdmv_pgs_subtitle    HDMV Presentation Graphic Stream subtitles (
                              ↳ decoders: pgssub)
 ..S... hdmv_text_subtitle   HDMV Text subtitle
 D.S... jacosub              JACOsub subtitle
 D.S... microdvd             MicroDVD subtitle
 DES... mov_text             MOV text
 D.S... mpl2                 MPL2 subtitle
 D.S... pjs                  PJS (Phoenix Japanimation Society) subtitle
 D.S... realtext             RealText subtitle
 D.S... sami                 SAMI subtitle
 ..S... srt                  SubRip subtitle with embedded timing
 ..S... ssa                  SSA (SubStation Alpha) subtitle
 D.S... stl                  Spruce subtitle format
 DES... subrip               SubRip subtitle (decoders: srt subrip ) (enc
                              ↳ oders: srt subrip)
 D.S... subviewer            SubViewer subtitle
 D.S... subviewer1           SubViewer v1 subtitle
 DES... text                 raw UTF-8 text
 .ES... ttml                 Timed Text Markup Language
 D.S... vplayer              VPlayer subtitle
 DES... webvtt               WebVTT subtitle
 DES... xsub                 XSUB
```

ANNEXURE 2:
Sample list of decoders

This annexure contains sample output for the command `ffmpeg -decoders`.

```
Decoders:
V..... = Video
A..... = Audio
S..... = Subtitle
.F.... = Frame-level multithreading
..S... = Slice-level multithreading
...X.. = Codec is experimental
....B. = Supports draw_horiz_band
.....D = Supports direct rendering method 1
------
V....D 012v                 Uncompressed 4:2:2 10-bit
V....D 4xm                  4X Movie
V....D 8bps                 QuickTime 8BPS video
V....D aasc                 Autodesk RLE
V....D agm                  Amuse Graphics Movie
VF...D aic                  Apple Intermediate Codec
V....D alias_pix            Alias/Wavefront PIX image
V....D amv                  AMV Video
V....D anm                  Deluxe Paint Animation
V....D ansi                 ASCII/ANSI art
VF...D apng                 APNG (Animated Portable Network Graphics) im
                             ↳ age
V....D arbc                 Gryphon's Anim Compressor
V....D argo                 Argonaut Games Video
V....D asv1                 ASUS V1
V....D asv2                 ASUS V2
V....D aura                 Auravision AURA
V....D aura2                Auravision Aura 2
V..... libdav1d             dav1d AV1 decoder by VideoLAN (codec av1)
V....D libaom-av1           libaom AV1 (codec av1)
V....D av1                  Alliance for Open Media AV1
V..... av1_cuvid            Nvidia CUVID AV1 decoder (codec av1)
V....D av1_qsv              AV1 video (Intel Quick Sync Video accelerati
                             ↳ on) (codec av1)
V....D avrn                 Avid AVI Codec
V....D avrp                 Avid 1:1 10-bit RGB Packer
V....D avs                  AVS (Audio Video Standard) video
V..... libdavs2             libdavs2 AVS2-P2/IEEE1857.4 (codec avs2)
V....D libuavs3d            libuavs3d AVS3-P2/IEEE1857.10 (codec avs3)
V....D avui                 Avid Meridien Uncompressed
V....D ayuv                 Uncompressed packed MS 4:4:4:4
V....D bethsoftvid          Bethesda VID video
V....D bfi                  Brute Force & Ignorance
V....D binkvideo            Bink video
V....D bintext              Binary text
VF.... bitpacked            Bitpacked
V....D bmp                  BMP (Windows and OS/2 bitmap)
```

```
V....D bmv_video            Discworld II BMV video
V....D brender_pix          BRender PIX image
V....D c93                  Interplay C93
V....D cavs                 Chinese AVS (Audio Video Standard) (AVS1-P2,
                             ↳  JiZhun profile)
V....D cdgraphics           CD Graphics video
V....D cdtoons              CDToons video
V....D cdxl                 Commodore CDXL video
VF...D cfhd                 GoPro CineForm HD
V....D cinepak              Cinepak
V....D clearvideo           Iterated Systems ClearVideo
V....D cljr                 Cirrus Logic AccuPak
VF...D cllc                 Canopus Lossless Codec
V....D eacmv                Electronic Arts CMV video (codec cmv)
V....D cpia                 CPiA video format
VF...D cri                  Cintel RAW
V....D camstudio            CamStudio (codec cscd)
V....D cyuv                 Creative YUV (CYUV)
V.S..D dds                  DirectDraw Surface image decoder
V....D dfa                  Chronomaster DFA
V.S..D dirac                BBC Dirac VC-2
VFS..D dnxhd                VC3/DNxHD
V....D dpx                  DPX (Digital Picture Exchange) image
V....D dsicinvideo          Delphine Software International CIN video
VFS..D dvvideo              DV (Digital Video)
V....D dxa                  Feeble Files/ScummVM DXA
VF...D dxtory               Dxtory
VFS..D dxv                  Resolume DXV
V....D escape124            Escape 124
V....D escape130            Escape 130
VFS..D exr                  OpenEXR image
VFS..D ffv1                 FFmpeg video codec #1
VF..BD ffvhuff              Huffyuv FFmpeg variant
V.S..D fic                  Mirillis FIC
V....D fits                 Flexible Image Transport System
V....D flashsv              Flash Screen Video v1
V....D flashsv2             Flash Screen Video v2
V....D flic                 Autodesk Animator Flic video
V...BD flv                  FLV / Sorenson Spark / Sorenson H.263 (Flash
                             ↳  Video) (codec flv1)
V....D fmvc                 FM Screen Capture Codec
VF...D fraps                Fraps
V....D frwu                 Forward Uncompressed
V....D g2m                  Go2Meeting
V....D gdv                  Gremlin Digital Video
V....D gem                  GEM Raster image
V....D gif                  GIF (Graphics Interchange Format)
V....D h261                 H.261
V...BD h263                 H.263 / H.263-1996, H.263+ / H.263-1998 / H.
                             ↳ 263 version 2
V..... h263_v4l2m2m         V4L2 mem2mem H.263 decoder wrapper (codec h2
                             ↳ 63)
V...BD h263i                Intel H.263
V...BD h263p                H.263 / H.263-1996, H.263+ / H.263-1998 / H.
                             ↳ 263 version 2
VFS..D h264                 H.264 / AVC / MPEG-4 AVC / MPEG-4 part 10
V..... h264_v4l2m2m         V4L2 mem2mem H.264 decoder wrapper (codec h2
                             ↳ 64)
V....D h264_qsv             H264 video (Intel Quick Sync Video accelerat
                             ↳ ion) (codec h264)
V..... h264_cuvid           Nvidia CUVID H264 decoder (codec h264)
VFS..D hap                  Vidvox Hap
VF...D hdr                  HDR (Radiance RGBE format) image
```

```
VFS..D hevc                 HEVC (High Efficiency Video Coding)
V..... hevc_v4l2m2m         V4L2 mem2mem HEVC decoder wrapper (codec hev
                             ↳ c)
V....D hevc_qsv             HEVC video (Intel Quick Sync Video accelerat
                             ↳ ion) (codec hevc)
V..... hevc_cuvid           Nvidia CUVID HEVC decoder (codec hevc)
V....D hnm4video            HNM 4 video
V....D hq_hqa               Canopus HQ/HQA
VFS..D hqx                  Canopus HQX
VF..BD huffyuv              Huffyuv / HuffYUV
VF..BD hymt                 HuffYUV MT
V....D idcinvideo           id Quake II CIN video (codec idcin)
V....D idf                  iCEDraw text
V....D iff                  IFF ACBM/ANIM/DEEP/ILBM/PBM/RGB8/RGBN (codec
                             ↳  iff_ilbm)
V....D imm4                 Infinity IMM4
V..... imm5                 Infinity IMM5
V....D indeo2               Intel Indeo 2
V....D indeo3               Intel Indeo 3
V....D indeo4               Intel Indeo Video Interactive 4
V....D indeo5               Intel Indeo Video Interactive 5
V....D interplayvideo       Interplay MVE video
V....D ipu                  IPU Video
VFS..D jpeg2000             JPEG 2000
VF...D libopenjpeg          OpenJPEG JPEG 2000 (codec jpeg2000)
V....D jpegls               JPEG-LS
V....D libjxl               libjxl JPEG XL (codec jpegxl)
V....D jv                   Bitmap Brothers JV video
V....D kgv1                 Kega Game Video
V....D kmvc                 Karl Morton's video codec
VF...D lagarith             Lagarith lossless
V....D loco                 LOCO
V....D lscr                 LEAD Screen Capture
V....D m101                 Matrox Uncompressed SD
V....D eamad                Electronic Arts Madcow Video (codec mad)
VFS..D magicyuv             MagicYUV video
VF...D mdec                 Sony PlayStation MDEC (Motion DECoder)
VF...D mimic                Mimic
V....D mjpeg                MJPEG (Motion JPEG)
V..... mjpeg_cuvid          Nvidia CUVID MJPEG decoder (codec mjpeg)
V....D mjpeg_qsv            MJPEG video (Intel Quick Sync Video accelera
                             ↳ tion) (codec mjpeg)
V....D mjpegb               Apple MJPEG-B
V....D mmvideo              American Laser Games MM Video
V....D mobiclip             MobiClip Video
V....D motionpixels         Motion Pixels video
V.S.BD mpeg1video           MPEG-1 video
V..... mpeg1_v4l2m2m        V4L2 mem2mem MPEG1 decoder wrapper (codec mp
                             ↳ eg1video)
V..... mpeg1_cuvid          Nvidia CUVID MPEG1VIDEO decoder (codec mpeg1
                             ↳ video)
V.S.BD mpeg2video           MPEG-2 video
V.S.BD mpegvideo            MPEG-1 video (codec mpeg2video)
V..... mpeg2_v4l2m2m        V4L2 mem2mem MPEG2 decoder wrapper (codec mp
                             ↳ eg2video)
V....D mpeg2_qsv            MPEG2VIDEO video (Intel Quick Sync Video acc
                             ↳ eleration) (codec mpeg2video)
V..... mpeg2_cuvid          Nvidia CUVID MPEG2VIDEO decoder (codec mpeg2
                             ↳ video)
VF..BD mpeg4                MPEG-4 part 2
V..... mpeg4_v4l2m2m        V4L2 mem2mem MPEG4 decoder wrapper (codec mp
                             ↳ eg4)
V..... mpeg4_cuvid          Nvidia CUVID MPEG4 decoder (codec mpeg4)
```

```
V....D msa1                 MS ATC Screen
V....D mscc                 Mandsoft Screen Capture Codec
V...BD msmpeg4v1            MPEG-4 part 2 Microsoft variant version 1
V...BD msmpeg4v2            MPEG-4 part 2 Microsoft variant version 2
V...BD msmpeg4              MPEG-4 part 2 Microsoft variant version 3 (c
                              ↳ odec msmpeg4v3)
V....D msp2                 Microsoft Paint (MSP) version 2
V....D msrle                Microsoft RLE
V....D mss1                 MS Screen 1
V....D mss2                 MS Windows Media Video V9 Screen
V....D msvideo1             Microsoft Video 1
VF...D mszh                 LCL (LossLess Codec Library) MSZH
V....D mts2                 MS Expression Encoder Screen
V....D mv30                 MidiVid 3.0
V....D mvc1                 Silicon Graphics Motion Video Compressor 1
V....D mvc2                 Silicon Graphics Motion Video Compressor 2
V....D mvdv                 MidiVid VQ
V....D mvha                 MidiVid Archive Codec
V....D mwsc                 MatchWare Screen Capture Codec
V....D mxpeg                Mobotix MxPEG video
VF...D notchlc              NotchLC
V....D nuv                  NuppelVideo/RTJPEG
V....D paf_video            Amazing Studio Packed Animation File Video
V....D pam                  PAM (Portable AnyMap) image
V....D pbm                  PBM (Portable BitMap) image
V....D pcx                  PC Paintbrush PCX image
V....D pfm                  PFM (Portable FloatMap) image
V....D pgm                  PGM (Portable GrayMap) image
V....D pgmyuv               PGMYUV (Portable GrayMap YUV) image
V....D pgx                  PGX (JPEG2000 Test Format)
V....D phm                  PHM (Portable HalfFloatMap) image
VF...D photocd              Kodak Photo CD
V....D pictor               Pictor/PC Paint
VF...D pixlet               Apple Pixlet
VF...D png                  PNG (Portable Network Graphics) image
V....D ppm                  PPM (Portable PixelMap) image
VFS..D prores               Apple ProRes (iCodec Pro)
V....D prosumer             Brooktree ProSumer Video
VF...D psd                  Photoshop PSD file
V....D ptx                  V.Flash PTX image
V....D qdraw                Apple QuickDraw
VF...D qoi                  QOI (Quite OK Image format) image
V....D qpeg                 Q-team QPEG
V....D qtrle                QuickTime Animation (RLE) video
V....D r10k                 AJA Kona 10-bit RGB Codec
V....D r210                 Uncompressed RGB 10-bit
V....D rasc                 RemotelyAnywhere Screen Capture
V..... rawvideo             raw video
V....D rl2                  RL2 video
V....D roqvideo             id RoQ video (codec roq)
V....D rpza                 QuickTime video (RPZA)
V....D rscc                 innoHeim/Rsupport Screen Capture Codec
V....D rv10                 RealVideo 1.0
V....D rv20                 RealVideo 2.0
VF...D rv30                 RealVideo 3.0
VF...D rv40                 RealVideo 4.0
V....D sanm                 LucasArts SANM/Smush video
V....D scpr                 ScreenPressor
V....D screenpresso         Screenpresso
V....D sga                  Digital Pictures SGA Video
V....D sgi                  SGI image
V....D sgirle               Silicon Graphics RLE 8-bit video
VF...D sheervideo           BitJazz SheerVideo
```

```
V....D simbiosis_imx        Simbiosis Interactive IMX Video
V....D smackvid             Smacker video (codec smackvideo)
V....D smc                  QuickTime Graphics (SMC)
V....D smvjpeg              SMV JPEG
V....D snow                 Snow
V....D sp5x                 Sunplus JPEG (SP5X)
V....D speedhq              NewTek SpeedHQ
V....D srgc                 Screen Recorder Gold Codec
V....D sunrast              Sun Rasterfile image
V....D svq1                 Sorenson Vector Quantizer 1 / Sorenson Video
                             ↳  1 / SVQ1
V...BD svq3                 Sorenson Vector Quantizer 3 / Sorenson Video
                             ↳  3 / SVQ3
V....D targa                Truevision Targa image
V....D targa_y216           Pinnacle TARGA CineWave YUV16
V....D tdsc                 TDSC
V....D eatgq                Electronic Arts TGQ video (codec tgq)
V....D eatgv                Electronic Arts TGV video (codec tgv)
VF..BD theora               Theora
V....D thp                  Nintendo Gamecube THP video
V....D tiertexseqvideo      Tiertex Limited SEQ video
VF...D tiff                 TIFF image
V....D tmv                  8088flex TMV
V....D eatqi                Electronic Arts TQI Video (codec tqi)
V....D truemotion1          Duck TrueMotion 1.0
V....D truemotion2          Duck TrueMotion 2.0
V....D truemotion2rt        Duck TrueMotion 2.0 Real Time
V....D camtasia             TechSmith Screen Capture Codec (codec tscc)
V....D tscc2                TechSmith Screen Codec 2
V....D txd                  Renderware TXD (TeXture Dictionary) image
V....D ultimotion           IBM UltiMotion (codec ulti)
VF...D utvideo              Ut Video
VFS..D v210                 Uncompressed 4:2:2 10-bit
V....D v210x                Uncompressed 4:2:2 10-bit
V....D v308                 Uncompressed packed 4:4:4
V....D v408                 Uncompressed packed QT 4:4:4:4
VFS..D v410                 Uncompressed 4:4:4 10-bit
V....D vb                   Beam Software VB
VF...D vble                 VBLE Lossless Codec
V.S..D vbn                  Vizrt Binary Image
V....D vc1                  SMPTE VC-1
V..... vc1_v4l2m2m          V4L2 mem2mem VC1 decoder wrapper (codec vc1)
V....D vc1_qsv              VC1 video (Intel Quick Sync Video accelerati
                             ↳ on) (codec vc1)
V..... vc1_cuvid            Nvidia CUVID VC1 decoder (codec vc1)
V....D vc1image             Windows Media Video 9 Image v2
V....D vcr1                 ATI VCR1
V....D xl                   Miro VideoXL (codec vixl)
V....D vmdvideo             Sierra VMD video
V....D vmnc                 VMware Screen Codec / VMware Video
VF..BD vp3                  On2 VP3
VF..BD vp4                  On2 VP4
V....D vp5                  On2 VP5
V....D vp6                  On2 VP6
V.S..D vp6a                 On2 VP6 (Flash version, with alpha channel)
V....D vp6f                 On2 VP6 (Flash version)
V....D vp7                  On2 VP7
VFS..D vp8                  On2 VP8
V..... vp8_v4l2m2m          V4L2 mem2mem VP8 decoder wrapper (codec vp8)
V....D libvpx               libvpx VP8 (codec vp8)
V..... vp8_cuvid            Nvidia CUVID VP8 decoder (codec vp8)
V....D vp8_qsv              VP8 video (Intel Quick Sync Video accelerati
                             ↳ on) (codec vp8)
```

```
VFS..D vp9                  Google VP9
V..... vp9_v4l2m2m          V4L2 mem2mem VP9 decoder wrapper (codec vp9)
V..... libvpx-vp9           libvpx VP9 (codec vp9)
V..... vp9_cuvid            Nvidia CUVID VP9 decoder (codec vp9)
V....D vp9_qsv              VP9 video (Intel Quick Sync Video accelerati
                             ↳ on) (codec vp9)
VF...D wbmp                 WBMP (Wireless Application Protocol Bitmap)
                             ↳ image
V....D wcmv                 WinCAM Motion Video
VF...D webp                 WebP image
V...BD wmv1                 Windows Media Video 7
V...BD wmv2                 Windows Media Video 8
V....D wmv3                 Windows Media Video 9
V....D wmv3image            Windows Media Video 9 Image
V....D wnv1                 Winnov WNV1
V..... wrapped_avframe      AVPacket to AVFrame passthrough
V....D vqavideo             Westwood Studios VQA (Vector Quantized Anima
                             ↳ tion) video (codec ws_vqa)
V....D xan_wc3              Wing Commander III / Xan
V....D xan_wc4              Wing Commander IV / Xxan
V....D xbin                 eXtended BINary text
V....D xbm                  XBM (X BitMap) image
V....D xface                X-face image
V....D xpm                  XPM (X PixMap) image
V....D xwd                  XWD (X Window Dump) image
V....D y41p                 Uncompressed YUV 4:1:1 12-bit
VF...D ylc                  YUY2 Lossless Codec
V..... yop                  Psygnosis YOP Video
V....D yuv4                 Uncompressed packed 4:2:0
V....D zerocodec            ZeroCodec Lossless Video
VF...D zlib                 LCL (LossLess Codec Library) ZLIB
V....D zmbv                 Zip Motion Blocks Video
A....D 8svx_exp             8SVX exponential
A....D 8svx_fib             8SVX fibonacci
A....D aac                  AAC (Advanced Audio Coding)
A....D aac_fixed            AAC (Advanced Audio Coding) (codec aac)
A....D libfdk_aac           Fraunhofer FDK AAC (codec aac)
A....D aac_latm             AAC LATM (Advanced Audio Coding LATM syntax)
A....D ac3                  ATSC A/52A (AC-3)
A....D ac3_fixed            ATSC A/52A (AC-3) (codec ac3)
A....D acelp.kelvin         Sipro ACELP.KELVIN
A....D adpcm_4xm            ADPCM 4X Movie
A....D adpcm_adx            SEGA CRI ADX ADPCM
A....D adpcm_afc            ADPCM Nintendo Gamecube AFC
A....D adpcm_agm            ADPCM AmuseGraphics Movie
A....D adpcm_aica           ADPCM Yamaha AICA
A....D adpcm_argo           ADPCM Argonaut Games
A....D adpcm_ct             ADPCM Creative Technology
A....D adpcm_dtk            ADPCM Nintendo Gamecube DTK
A....D adpcm_ea             ADPCM Electronic Arts
A....D adpcm_ea_maxis_xa    ADPCM Electronic Arts Maxis CDROM XA
A....D adpcm_ea_r1          ADPCM Electronic Arts R1
A....D adpcm_ea_r2          ADPCM Electronic Arts R2
A....D adpcm_ea_r3          ADPCM Electronic Arts R3
A....D adpcm_ea_xas         ADPCM Electronic Arts XAS
A....D g722                 G.722 ADPCM (codec adpcm_g722)
A....D g726                 G.726 ADPCM (codec adpcm_g726)
A....D g726le               G.726 ADPCM little-endian (codec adpcm_g726l
                             ↳ e)
A....D adpcm_ima_acorn      ADPCM IMA Acorn Replay
A....D adpcm_ima_alp        ADPCM IMA High Voltage Software ALP
A....D adpcm_ima_amv        ADPCM IMA AMV
A....D adpcm_ima_apc        ADPCM IMA CRYO APC
```

```
A....D adpcm_ima_apm         ADPCM IMA Ubisoft APM
A....D adpcm_ima_cunning     ADPCM IMA Cunning Developments
A....D adpcm_ima_dat4        ADPCM IMA Eurocom DAT4
A....D adpcm_ima_dk3         ADPCM IMA Duck DK3
A....D adpcm_ima_dk4         ADPCM IMA Duck DK4
A....D adpcm_ima_ea_eacs     ADPCM IMA Electronic Arts EACS
A....D adpcm_ima_ea_sead     ADPCM IMA Electronic Arts SEAD
A....D adpcm_ima_iss         ADPCM IMA Funcom ISS
A....D adpcm_ima_moflex      ADPCM IMA MobiClip MOFLEX
A....D adpcm_ima_mtf         ADPCM IMA Capcom's MT Framework
A....D adpcm_ima_oki         ADPCM IMA Dialogic OKI
A....D adpcm_ima_qt          ADPCM IMA QuickTime
A....D adpcm_ima_rad         ADPCM IMA Radical
A....D adpcm_ima_smjpeg      ADPCM IMA Loki SDL MJPEG
A....D adpcm_ima_ssi         ADPCM IMA Simon & Schuster Interactive
A....D adpcm_ima_wav         ADPCM IMA WAV
A....D adpcm_ima_ws          ADPCM IMA Westwood
A....D adpcm_ms              ADPCM Microsoft
A....D adpcm_mtaf            ADPCM MTAF
A....D adpcm_psx             ADPCM Playstation
A....D adpcm_sbpro_2         ADPCM Sound Blaster Pro 2-bit
A....D adpcm_sbpro_3         ADPCM Sound Blaster Pro 2.6-bit
A....D adpcm_sbpro_4         ADPCM Sound Blaster Pro 4-bit
A....D adpcm_swf             ADPCM Shockwave Flash
A....D adpcm_thp             ADPCM Nintendo THP
A....D adpcm_thp_le          ADPCM Nintendo THP (little-endian)
A....D adpcm_vima            LucasArts VIMA audio
A....D adpcm_xa              ADPCM CDROM XA
A....D adpcm_yamaha          ADPCM Yamaha
A....D adpcm_zork            ADPCM Zork
AF...D alac                  ALAC (Apple Lossless Audio Codec)
A....D amrnb                 AMR-NB (Adaptive Multi-Rate NarrowBand) (cod
                              ↳ ec amr_nb)
A....D libopencore_amrnb     OpenCORE AMR-NB (Adaptive Multi-Rate Narrow-
                              ↳ Band) (codec amr_nb)
A....D amrwb                 AMR-WB (Adaptive Multi-Rate WideBand) (codec
                              ↳  amr_wb)
A....D libopencore_amrwb     OpenCORE AMR-WB (Adaptive Multi-Rate Wide-Ba
                              ↳ nd) (codec amr_wb)
A....D ape                   Monkey's Audio
A....D aptx                  aptX (Audio Processing Technology for Blueto
                              ↳ oth)
A....D aptx_hd               aptX HD (Audio Processing Technology for Blu
                              ↳ etooth)
A....D atrac1                ATRAC1 (Adaptive TRansform Acoustic Coding)
A....D atrac3                ATRAC3 (Adaptive TRansform Acoustic Coding 3
                              ↳ )
A....D atrac3al              ATRAC3 AL (Adaptive TRansform Acoustic Codin
                              ↳ g 3 Advanced Lossless)
A....D atrac3plus            ATRAC3+ (Adaptive TRansform Acoustic Coding
                              ↳ 3+) (codec atrac3p)
A....D atrac3plusal          ATRAC3+ AL (Adaptive TRansform Acoustic Codi
                              ↳ ng 3+ Advanced Lossless) (codec atrac3pal)
A....D atrac9                ATRAC9 (Adaptive TRansform Acoustic Coding 9
                              ↳ )
A....D on2avc                On2 Audio for Video Codec (codec avc)
A....D binkaudio_dct         Bink Audio (DCT)
A....D binkaudio_rdft        Bink Audio (RDFT)
A....D bmv_audio             Discworld II BMV audio
A....D comfortnoise          RFC 3389 comfort noise generator
A....D cook                  Cook / Cooker / Gecko (RealAudio G2)
A....D derf_dpcm             DPCM Xilam DERF
A....D dfpwm                 DFPWM1a audio
```

```
A....D dolby_e              Dolby E
A.S..D dsd_lsbf             DSD (Direct Stream Digital), least significa
                             ↳ nt bit first
A.S..D dsd_lsbf_planar      DSD (Direct Stream Digital), least significa
                             ↳ nt bit first, planar
A.S..D dsd_msbf             DSD (Direct Stream Digital), most significan
                             ↳ t bit first
A.S..D dsd_msbf_planar      DSD (Direct Stream Digital), most significan
                             ↳ t bit first, planar
A....D dsicinaudio          Delphine Software International CIN audio
A....D dss_sp               Digital Speech Standard - Standard Play mode
                             ↳  (DSS SP)
A....D dst                  DST (Digital Stream Transfer)
A....D dca                  DCA (DTS Coherent Acoustics) (codec dts)
A....D dvaudio              Ulead DV Audio
A....D eac3                 ATSC A/52B (AC-3, E-AC-3)
A....D evrc                 EVRC (Enhanced Variable Rate Codec)
A....D fastaudio            MobiClip FastAudio
AF...D flac                 FLAC (Free Lossless Audio Codec)
A....D g723_1               G.723.1
A....D g729                 G.729
A....D gremlin_dpcm         DPCM Gremlin
A....D gsm                  GSM
A....D libgsm               libgsm GSM (codec gsm)
A....D gsm_ms               GSM Microsoft variant
A....D libgsm_ms            libgsm GSM Microsoft variant (codec gsm_ms)
A....D hca                  CRI HCA
A....D hcom                 HCOM Audio
A....D iac                  IAC (Indeo Audio Coder)
A....D ilbc                 iLBC (Internet Low Bitrate Codec)
A....D libilbc              iLBC (Internet Low Bitrate Codec) (codec ilb
                             ↳ c)
A....D imc                  IMC (Intel Music Coder)
A....D interplay_dpcm       DPCM Interplay
A....D interplayacm         Interplay ACM
A....D mace3                MACE (Macintosh Audio Compression/Expansion)
                             ↳  3:1
A....D mace6                MACE (Macintosh Audio Compression/Expansion)
                             ↳  6:1
A....D metasound            Voxware MetaSound
A....D mlp                  MLP (Meridian Lossless Packing)
A....D mp1                  MP1 (MPEG audio layer 1)
A....D mp1float             MP1 (MPEG audio layer 1) (codec mp1)
A....D mp2                  MP2 (MPEG audio layer 2)
A....D mp2float             MP2 (MPEG audio layer 2) (codec mp2)
A....D mp3float             MP3 (MPEG audio layer 3) (codec mp3)
A....D mp3                  MP3 (MPEG audio layer 3)
A....D mp3adufloat          ADU (Application Data Unit) MP3 (MPEG audio
                             ↳ layer 3) (codec mp3adu)
A....D mp3adu               ADU (Application Data Unit) MP3 (MPEG audio
                             ↳ layer 3)
A....D mp3on4float          MP3onMP4 (codec mp3on4)
A....D mp3on4               MP3onMP4
A....D als                  MPEG-4 Audio Lossless Coding (ALS) (codec mp
                             ↳ 4als)
A....D msnsiren             MSN Siren
A....D mpc7                 Musepack SV7 (codec musepack7)
A....D mpc8                 Musepack SV8 (codec musepack8)
A....D nellymoser           Nellymoser Asao
A....D opus                 Opus
A....D libopus              libopus Opus (codec opus)
A....D paf_audio            Amazing Studio Packed Animation File Audio
A....D pcm_alaw             PCM A-law / G.711 A-law
```

```
A....D pcm_bluray           PCM signed 16|20|24-bit big-endian for Blu-r
                             ↳ ay media
A....D pcm_dvd              PCM signed 16|20|24-bit big-endian for DVD m
                             ↳ edia
A....D pcm_f16le            PCM 16.8 floating point little-endian
A....D pcm_f24le            PCM 24.0 floating point little-endian
A....D pcm_f32be            PCM 32-bit floating point big-endian
A....D pcm_f32le            PCM 32-bit floating point little-endian
A....D pcm_f64be            PCM 64-bit floating point big-endian
A....D pcm_f64le            PCM 64-bit floating point little-endian
A....D pcm_lxf              PCM signed 20-bit little-endian planar
A....D pcm_mulaw            PCM mu-law / G.711 mu-law
A....D pcm_s16be            PCM signed 16-bit big-endian
A....D pcm_s16be_planar     PCM signed 16-bit big-endian planar
A....D pcm_s16le            PCM signed 16-bit little-endian
A....D pcm_s16le_planar     PCM signed 16-bit little-endian planar
A....D pcm_s24be            PCM signed 24-bit big-endian
A....D pcm_s24daud          PCM D-Cinema audio signed 24-bit
A....D pcm_s24le            PCM signed 24-bit little-endian
A....D pcm_s24le_planar     PCM signed 24-bit little-endian planar
A....D pcm_s32be            PCM signed 32-bit big-endian
A....D pcm_s32le            PCM signed 32-bit little-endian
A....D pcm_s32le_planar     PCM signed 32-bit little-endian planar
A....D pcm_s64be            PCM signed 64-bit big-endian
A....D pcm_s64le            PCM signed 64-bit little-endian
A....D pcm_s8               PCM signed 8-bit
A....D pcm_s8_planar        PCM signed 8-bit planar
A....D pcm_sga              PCM SGA
A....D pcm_u16be            PCM unsigned 16-bit big-endian
A....D pcm_u16le            PCM unsigned 16-bit little-endian
A....D pcm_u24be            PCM unsigned 24-bit big-endian
A....D pcm_u24le            PCM unsigned 24-bit little-endian
A....D pcm_u32be            PCM unsigned 32-bit big-endian
A....D pcm_u32le            PCM unsigned 32-bit little-endian
A....D pcm_u8               PCM unsigned 8-bit
A....D pcm_vidc             PCM Archimedes VIDC
A....D qcelp                QCELP / PureVoice
A....D qdm2                 QDesign Music Codec 2
A....D qdmc                 QDesign Music Codec 1
A....D real_144             RealAudio 1.0 (14.4K) (codec ra_144)
A....D real_288             RealAudio 2.0 (28.8K) (codec ra_288)
A....D ralf                 RealAudio Lossless
A....D roq_dpcm             DPCM id RoQ
A....D s302m                SMPTE 302M
A....D sbc                  SBC (low-complexity subband codec)
A....D sdx2_dpcm            DPCM Squareroot-Delta-Exact
A....D shorten              Shorten
A....D sipr                 RealAudio SIPR / ACELP.NET
A....D siren                Siren
A....D smackaud             Smacker audio (codec smackaudio)
A....D sol_dpcm             DPCM Sol
A..X.D sonic                Sonic
A....D speex                Speex
A....D libspeex             libspeex Speex (codec speex)
AF...D tak                  TAK (Tom's lossless Audio Kompressor)
A....D truehd               TrueHD
A....D truespeech           DSP Group TrueSpeech
AF...D tta                  TTA (True Audio)
A....D twinvq               VQF TwinVQ
A....D vmdaudio             Sierra VMD audio
A....D vorbis               Vorbis
A..... libvorbis            libvorbis (codec vorbis)
A....D wavesynth            Wave synthesis pseudo-codec
```

```
AFS..D wavpack              WavPack
A....D ws_snd1              Westwood Audio (SND1) (codec westwood_snd1)
A....D wmalossless          Windows Media Audio Lossless
A....D wmapro               Windows Media Audio 9 Professional
A....D wmav1                Windows Media Audio 1
A....D wmav2                Windows Media Audio 2
A....D wmavoice             Windows Media Audio Voice
A....D xan_dpcm             DPCM Xan
A....D xma1                 Xbox Media Audio 1
A....D xma2                 Xbox Media Audio 2
S..... ssa                  ASS (Advanced SubStation Alpha) subtitle (co
                             ↳ dec ass)
S..... ass                  ASS (Advanced SubStation Alpha) subtitle
S..... dvbsub               DVB subtitles (codec dvb_subtitle)
S..... libzvbi_teletextdec  Libzvbi DVB teletext decoder (codec dvb_tele
                             ↳ text)
S..... dvdsub               DVD subtitles (codec dvd_subtitle)
S..... cc_dec               Closed Caption (EIA-608 / CEA-708) (codec ei
                             ↳ a_608)
S..... pgssub               HDMV Presentation Graphic Stream subtitles (
                             ↳ codec hdmv_pgs_subtitle)
S..... jacosub              JACOsub subtitle
S..... microdvd             MicroDVD subtitle
S..... mov_text             3GPP Timed Text subtitle
S..... mpl2                 MPL2 subtitle
S..... pjs                  PJS subtitle
S..... realtext             RealText subtitle
S..... sami                 SAMI subtitle
S..... stl                  Spruce subtitle format
S..... srt                  SubRip subtitle (codec subrip)
S..... subrip               SubRip subtitle
S..... subviewer            SubViewer subtitle
S..... subviewer1           SubViewer1 subtitle
S..... text                 Raw text subtitle
S..... vplayer              VPlayer subtitle
S..... webvtt               WebVTT subtitle
S..... xsub                 XSUB
```

ANNEXURE 3:
Sample list of encoders

This annexure contains sample output for the command `ffmpeg -encoders`.

```
Encoders:
V..... = Video
A..... = Audio
S..... = Subtitle
.F.... = Frame-level multithreading
..S... = Slice-level multithreading
...X.. = Codec is experimental
....B. = Supports draw_horiz_band
.....D = Supports direct rendering method 1
------
V....D a64multi             Multicolor charset for Commodore 64 (codec a
                             ↳ 64_multi)
V....D a64multi5            Multicolor charset for Commodore 64, extende
                             ↳ d with 5th color (colram) (codec a64_multi
                             ↳ 5)
V....D alias_pix            Alias/Wavefront PIX image
V..... amv                  AMV Video
V....D apng                 APNG (Animated Portable Network Graphics) im
                             ↳ age
V....D asv1                 ASUS V1
V....D asv2                 ASUS V2
V....D libaom-av1           libaom AV1 (codec av1)
V....D librav1e             librav1e AV1 (codec av1)
V..... libsvtav1            SVT-AV1(Scalable Video Technology for AV1) e
                             ↳ ncoder (codec av1)
V....D avrp                 Avid 1:1 10-bit RGB Packer
V....D libxavs2             libxavs2 AVS2-P2/IEEE1857.4 (codec avs2)
V..X.D avui                 Avid Meridien Uncompressed
V....D ayuv                 Uncompressed packed MS 4:4:4:4
VF...D bitpacked            Bitpacked
V....D bmp                  BMP (Windows and OS/2 bitmap)
VF...D cfhd                 GoPro CineForm HD
V....D cinepak              Cinepak
V....D cljr                 Cirrus Logic AccuPak
V.S..D vc2                  SMPTE VC-2 (codec dirac)
VFS..D dnxhd                VC3/DNxHD
V....D dpx                  DPX (Digital Picture Exchange) image
VFS..D dvvideo              DV (Digital Video)
VF...D exr                  OpenEXR image
V.S..D ffv1                 FFmpeg video codec #1
VF...D ffvhuff              Huffyuv FFmpeg variant
V....D fits                 Flexible Image Transport System
V....D flashsv              Flash Screen Video
V....D flashsv2             Flash Screen Video Version 2
V..... flv                  FLV / Sorenson Spark / Sorenson H.263 (Flash
                             ↳  Video) (codec flv1)
V....D gif                  GIF (Graphics Interchange Format)
```

```
V..... h261                 H.261
V..... h263                 H.263 / H.263-1996
V..... h263_v4l2m2m         V4L2 mem2mem H.263 encoder wrapper (codec h2
                             ↳ 63)
V.S... h263p                H.263+ / H.263-1998 / H.263 version 2
V....D libx264              libx264 H.264 / AVC / MPEG-4 AVC / MPEG-4 pa
                             ↳ rt 10 (codec h264)
V....D libx264rgb           libx264 H.264 / AVC / MPEG-4 AVC / MPEG-4 pa
                             ↳ rt 10 RGB (codec h264)
V..... h264_v4l2m2m         V4L2 mem2mem H.264 encoder wrapper (codec h2
                             ↳ 64)
V....D h264_vaapi           H.264/AVC (VAAPI) (codec h264)
V....D h264_amf             AMD AMF H.264 Encoder (codec h264)
V....D h264_mf              H264 via MediaFoundation (codec h264)
V....D h264_nvenc           NVIDIA NVENC H.264 encoder (codec h264)
V..... h264_qsv             H.264 / AVC / MPEG-4 AVC / MPEG-4 part 10 (I
                             ↳ ntel Quick Sync Video acceleration) (codec
                             ↳  h264)
V.S..D hap                  Vidvox Hap
VF...D hdr                  HDR (Radiance RGBE format) image
V....D libx265              libx265 H.265 / HEVC (codec hevc)
V..... hevc_v4l2m2m         V4L2 mem2mem HEVC encoder wrapper (codec hev
                             ↳ c)
V....D hevc_vaapi           H.265/HEVC (VAAPI) (codec hevc)
V....D hevc_amf             AMD AMF HEVC encoder (codec hevc)
V....D hevc_mf              HEVC via MediaFoundation (codec hevc)
V....D hevc_nvenc           NVIDIA NVENC hevc encoder (codec hevc)
V..... hevc_qsv             HEVC (Intel Quick Sync Video acceleration) (
                             ↳ codec hevc)
VF...D huffyuv              Huffyuv / HuffYUV
V....D jpeg2000             JPEG 2000
VF.... libopenjpeg          OpenJPEG JPEG 2000 (codec jpeg2000)
VF...D jpegls               JPEG-LS
V..... libjxl               libjxl JPEG XL (codec jpegxl)
VF...D ljpeg                Lossless JPEG
VF...D magicyuv             MagicYUV video
VFS... mjpeg                MJPEG (Motion JPEG)
V....D mjpeg_vaapi          MJPEG (VAAPI) (codec mjpeg)
V..... mjpeg_qsv            MJPEG (Intel Quick Sync Video acceleration)
                             ↳ (codec mjpeg)
V.S... mpeg1video           MPEG-1 video
V.S... mpeg2video           MPEG-2 video
V....D mpeg2_vaapi          MPEG-2 (VAAPI) (codec mpeg2video)
V..... mpeg2_qsv            MPEG-2 video (Intel Quick Sync Video acceler
                             ↳ ation) (codec mpeg2video)
V.S... mpeg4                MPEG-4 part 2
V....D libxvid              libxvidcore MPEG-4 part 2 (codec mpeg4)
V..... mpeg4_v4l2m2m        V4L2 mem2mem MPEG4 encoder wrapper (codec mp
                             ↳ eg4)
V..... msmpeg4v2            MPEG-4 part 2 Microsoft variant version 2
V..... msmpeg4              MPEG-4 part 2 Microsoft variant version 3 (c
                             ↳ odec msmpeg4v3)
V..... msvideo1             Microsoft Video-1
V....D pam                  PAM (Portable AnyMap) image
V....D pbm                  PBM (Portable BitMap) image
V....D pcx                  PC Paintbrush PCX image
V....D pfm                  PFM (Portable FloatMap) image
V....D pgm                  PGM (Portable GrayMap) image
V....D pgmyuv               PGMYUV (Portable GrayMap YUV) image
V....D phm                  PHM (Portable HalfFloatMap) image
VF...D png                  PNG (Portable Network Graphics) image
V....D ppm                  PPM (Portable PixelMap) image
VF...D prores               Apple ProRes
```

```
VF...D prores_aw            Apple ProRes (codec prores)
VFS... prores_ks            Apple ProRes (iCodec Pro) (codec prores)
VF...D qoi                  QOI (Quite OK Image format) image
V....D qtrle                QuickTime Animation (RLE) video
V....D r10k                 AJA Kona 10-bit RGB Codec
V....D r210                 Uncompressed RGB 10-bit
VF...D rawvideo             raw video
V....D roqvideo             id RoQ video (codec roq)
V....D rpza                 QuickTime video (RPZA)
V..... rv10                 RealVideo 1.0
V..... rv20                 RealVideo 2.0
V....D sgi                  SGI image
V....D smc                  QuickTime Graphics (SMC)
V....D snow                 Snow
V..... speedhq              NewTek SpeedHQ
V....D sunrast              Sun Rasterfile image
V....D svq1                 Sorenson Vector Quantizer 1 / Sorenson Video
                             ↳  1 / SVQ1
V....D targa                Truevision Targa image
V....D libtheora            libtheora Theora (codec theora)
VF...D tiff                 TIFF image
VF...D utvideo              Ut Video
VF...D v210                 Uncompressed 4:2:2 10-bit
V....D v308                 Uncompressed packed 4:4:4
V....D v408                 Uncompressed packed QT 4:4:4:4
V....D v410                 Uncompressed 4:4:4 10-bit
V.S..D vbn                  Vizrt Binary Image
V....D libvpx               libvpx VP8 (codec vp8)
V..... vp8_v4l2m2m          V4L2 mem2mem VP8 encoder wrapper (codec vp8)
V....D vp8_vaapi            VP8 (VAAPI) (codec vp8)
V....D libvpx-vp9           libvpx VP9 (codec vp9)
V....D vp9_vaapi            VP9 (VAAPI) (codec vp9)
V..... vp9_qsv              VP9 video (Intel Quick Sync Video accelerati
                             ↳ on) (codec vp9)
VF...D wbmp                 WBMP (Wireless Application Protocol Bitmap)
                             ↳ image
V....D libwebp_anim         libwebp WebP image (codec webp)
V....D libwebp              libwebp WebP image (codec webp)
V..... wmv1                 Windows Media Video 7
V..... wmv2                 Windows Media Video 8
V..... wrapped_avframe      AVFrame to AVPacket passthrough
V....D xbm                  XBM (X BitMap) image
V....D xface                X-face image
V....D xwd                  XWD (X Window Dump) image
V....D y41p                 Uncompressed YUV 4:1:1 12-bit
V....D yuv4                 Uncompressed packed 4:2:0
VF...D zlib                 LCL (LossLess Codec Library) ZLIB
V....D zmbv                 Zip Motion Blocks Video
A....D aac                  AAC (Advanced Audio Coding)
A....D libfdk_aac           Fraunhofer FDK AAC (codec aac)
A....D aac_mf               AAC via MediaFoundation (codec aac)
A....D ac3                  ATSC A/52A (AC-3)
A....D ac3_fixed            ATSC A/52A (AC-3) (codec ac3)
A....D ac3_mf               AC3 via MediaFoundation (codec ac3)
A....D adpcm_adx            SEGA CRI ADX ADPCM
A....D adpcm_argo           ADPCM Argonaut Games
A....D g722                 G.722 ADPCM (codec adpcm_g722)
A....D g726                 G.726 ADPCM (codec adpcm_g726)
A....D g726le               G.726 little endian ADPCM ("right-justified"
                             ↳ ) (codec adpcm_g726le)
A....D adpcm_ima_alp        ADPCM IMA High Voltage Software ALP
A....D adpcm_ima_amv        ADPCM IMA AMV
A....D adpcm_ima_apm        ADPCM IMA Ubisoft APM
```

```
A....D adpcm_ima_qt         ADPCM IMA QuickTime
A....D adpcm_ima_ssi        ADPCM IMA Simon & Schuster Interactive
A....D adpcm_ima_wav        ADPCM IMA WAV
A....D adpcm_ima_ws         ADPCM IMA Westwood
A....D adpcm_ms             ADPCM Microsoft
A....D adpcm_swf            ADPCM Shockwave Flash
A....D adpcm_yamaha         ADPCM Yamaha
A....D alac                 ALAC (Apple Lossless Audio Codec)
A....D libopencore_amrnb    OpenCORE AMR-NB (Adaptive Multi-Rate Narrow-
                             ↳ Band) (codec amr_nb)
A....D libvo_amrwbenc       Android VisualOn AMR-WB (Adaptive Multi-Rate
                             ↳  Wide-Band) (codec amr_wb)
A....D aptx                 aptX (Audio Processing Technology for Blueto
                             ↳ oth)
A....D aptx_hd              aptX HD (Audio Processing Technology for Blu
                             ↳ etooth)
A....D comfortnoise         RFC 3389 comfort noise generator
A....D dfpwm                DFPWM1a audio
A..X.D dca                  DCA (DTS Coherent Acoustics) (codec dts)
A....D eac3                 ATSC A/52 E-AC-3
A....D flac                 FLAC (Free Lossless Audio Codec)
A....D g723_1               G.723.1
A....D libgsm               libgsm GSM (codec gsm)
A....D libgsm_ms            libgsm GSM Microsoft variant (codec gsm_ms)
A....D libilbc              iLBC (Internet Low Bitrate Codec) (codec ilb
                             ↳ c)
A..X.D mlp                  MLP (Meridian Lossless Packing)
A....D mp2                  MP2 (MPEG audio layer 2)
A....D mp2fixed             MP2 fixed point (MPEG audio layer 2) (codec
                             ↳ mp2)
A....D libtwolame           libtwolame MP2 (MPEG audio layer 2) (codec m
                             ↳ p2)
A....D libmp3lame           libmp3lame MP3 (MPEG audio layer 3) (codec m
                             ↳ p3)
A....D libshine             libshine MP3 (MPEG audio layer 3) (codec mp3
                             ↳ )
A....D mp3_mf               MP3 via MediaFoundation (codec mp3)
A....D nellymoser           Nellymoser Asao
A..X.D opus                 Opus
A....D libopus              libopus Opus (codec opus)
A....D pcm_alaw             PCM A-law / G.711 A-law
A....D pcm_bluray           PCM signed 16|20|24-bit big-endian for Blu-r
                             ↳ ay media
A....D pcm_dvd              PCM signed 16|20|24-bit big-endian for DVD m
                             ↳ edia
A....D pcm_f32be            PCM 32-bit floating point big-endian
A....D pcm_f32le            PCM 32-bit floating point little-endian
A....D pcm_f64be            PCM 64-bit floating point big-endian
A....D pcm_f64le            PCM 64-bit floating point little-endian
A....D pcm_mulaw            PCM mu-law / G.711 mu-law
A....D pcm_s16be            PCM signed 16-bit big-endian
A....D pcm_s16be_planar     PCM signed 16-bit big-endian planar
A....D pcm_s16le            PCM signed 16-bit little-endian
A....D pcm_s16le_planar     PCM signed 16-bit little-endian planar
A....D pcm_s24be            PCM signed 24-bit big-endian
A....D pcm_s24daud          PCM D-Cinema audio signed 24-bit
A....D pcm_s24le            PCM signed 24-bit little-endian
A....D pcm_s24le_planar     PCM signed 24-bit little-endian planar
A....D pcm_s32be            PCM signed 32-bit big-endian
A....D pcm_s32le            PCM signed 32-bit little-endian
A....D pcm_s32le_planar     PCM signed 32-bit little-endian planar
A....D pcm_s64be            PCM signed 64-bit big-endian
A....D pcm_s64le            PCM signed 64-bit little-endian
```

```
A....D pcm_s8              PCM signed 8-bit
A....D pcm_s8_planar       PCM signed 8-bit planar
A....D pcm_u16be           PCM unsigned 16-bit big-endian
A....D pcm_u16le           PCM unsigned 16-bit little-endian
A....D pcm_u24be           PCM unsigned 24-bit big-endian
A....D pcm_u24le           PCM unsigned 24-bit little-endian
A....D pcm_u32be           PCM unsigned 32-bit big-endian
A....D pcm_u32le           PCM unsigned 32-bit little-endian
A....D pcm_u8              PCM unsigned 8-bit
A....D pcm_vidc            PCM Archimedes VIDC
A....D real_144            RealAudio 1.0 (14.4K) (codec ra_144)
A....D roq_dpcm            id RoQ DPCM
A..X.D s302m               SMPTE 302M
A....D sbc                 SBC (low-complexity subband codec)
A..X.D sonic               Sonic
A..X.D sonicls             Sonic lossless
A....D libspeex            libspeex Speex (codec speex)
A..X.D truehd              TrueHD
A....D tta                 TTA (True Audio)
A..X.D vorbis              Vorbis
A....D libvorbis           libvorbis (codec vorbis)
A....D wavpack             WavPack
A....D wmav1               Windows Media Audio 1
A....D wmav2               Windows Media Audio 2
S..... ssa                 ASS (Advanced SubStation Alpha) subtitle (co
                            ↳ dec ass)
S..... ass                 ASS (Advanced SubStation Alpha) subtitle
S..... dvbsub              DVB subtitles (codec dvb_subtitle)
S..... dvdsub              DVD subtitles (codec dvd_subtitle)
S..... mov_text            3GPP Timed Text subtitle
S..... srt                 SubRip subtitle (codec subrip)
S..... subrip              SubRip subtitle
S..... text                Raw text subtitle
S..... ttml                TTML subtitle
S..... webvtt              WebVTT subtitle
S..... xsub                DivX subtitles (XSUB)
```

ANNEXURE 4:
Sample list of filters

This annexure contains sample output for the command `ffmpeg -filters`.

```
Filters:
T.. = Timeline support
.S. = Slice threading
..C = Command support
A = Audio input/output
V = Video input/output
N = Dynamic number and/or type of input/output
| = Source or sink filter
... abench            A->A       Benchmark part of a filtergraph
..C acompressor       A->A       Audio compressor
... acontrast         A->A       Simple audio dynamic range compression/
                                  ↳ expansion filter
... acopy             A->A       Copy the input audio unchanged to the o
                                  ↳ utput
... acue              A->A       Delay filtering to match a cue
... acrossfade        AA->A      Cross fade two input audio streams
.S. acrossover        A->N       Split audio into per-bands streams
T.C acrusher          A->A       Reduce audio bit resolution
TS. adeclick          A->A       Remove impulsive noise from input audio
TS. adeclip           A->A       Remove clipping from input audio
TS. adecorrelate      A->A       Apply decorrelation to input audio
T.C adelay            A->A       Delay one or more audio channels
TSC adenorm           A->A       Remedy denormals by adding extremely lo
                                  ↳ w-level noise
T.. aderivative       A->A       Compute derivative of input audio
TSC adynamicequalizer A->A       Apply Dynamic Equalization of input aud
                                  ↳ io
T.C adynamicsmooth    A->A       Apply Dynamic Smoothing of input audio
... aecho             A->A       Add echoing to the audio
TSC aemphasis         A->A       Audio emphasis
T.. aeval             A->A       Filter audio signal according to a spec
                                  ↳ ified expression
T.C aexciter          A->A       Enhance high frequency part of audio
T.C afade             A->A       Fade in/out input audio
TSC afftdn            A->A       Denoise audio samples using FFT
TS. afftfilt          A->A       Apply arbitrary expressions to samples
                                  ↳ in frequency domain
.SC afir              N->N       Apply Finite Impulse Response filter wi
                                  ↳ th supplied coefficients in additiona
                                  ↳ l stream(s)
... aformat           A->A       Convert the input audio to one of the s
                                  ↳ pecified formats
TSC afreqshift        A->A       Apply frequency shifting to input audio
TSC afwtdn            A->A       Denoise audio stream using Wavelets
T.C agate             A->A       Audio gate
.S. aiir              A->N       Apply Infinite Impulse Response filter
                                  ↳ with supplied coefficients
```

```
T.. aintegral          A->A       Compute integral of input audio
... ainterleave        N->A       Temporally interleave audio inputs
T.. alatency           A->A       Report audio filtering latency
T.C alimiter           A->A       Audio lookahead limiter
TSC allpass            A->A       Apply a two-pole all-pass filter
... aloop              A->A       Loop audio samples
... amerge             N->A       Merge two or more audio streams into a
                                   ↳ single multi-channel stream
T.. ametadata          A->A       Manipulate audio frame metadata
..C amix               N->A       Audio mixing
... amultiply          AA->A      Multiply two audio streams
TSC anequalizer        A->N       Apply high-order audio parametric multi
                                   ↳ band equalizer
TSC anlmdn             A->A       Reduce broadband noise from stream usin
                                   ↳ g Non-Local Means
TSC anlmf              AA->A      Apply Normalized Least-Mean-Fourth algo
                                   ↳ rithm to first audio stream
TSC anlms              AA->A      Apply Normalized Least-Mean-Squares alg
                                   ↳ orithm to first audio stream
... anull              A->A       Pass the source unchanged to the output
T.. apad               A->A       Pad audio with silence
T.C aperms             A->A       Set permissions for the output audio fr
                                   ↳ ame
... aphaser            A->A       Add a phasing effect to the audio
TSC aphaseshift        A->A       Apply phase shifting to input audio
TSC apsyclip           A->A       Audio Psychoacoustic Clipper
... apulsator          A->A       Audio pulsator
..C arealtime          A->A       Slow down filtering to match realtime
... aresample          A->A       Resample audio data
... areverse           A->A       Reverse an audio clip
TSC arnndn             A->A       Reduce noise from speech using Recurren
                                   ↳ t Neural Networks
... asdr               AA->A      Measure Audio Signal-to-Distortion Rati
                                   ↳ o
... asegment           A->N       Segment audio stream
... aselect            A->N       Select audio frames to pass in output
... asendcmd           A->A       Send commands to filters
... asetnsamples       A->A       Set the number of samples for each outp
                                   ↳ ut audio frames
... asetpts            A->A       Set PTS for the output audio frame
... asetrate           A->A       Change the sample rate without altering
                                   ↳ the data
... asettb             A->A       Set timebase for the audio output link
... ashowinfo          A->A       Show textual information for each audio
                                   ↳ frame
T.. asidedata          A->A       Manipulate audio frame side data
TSC asoftclip          A->A       Audio Soft Clipper
.S. aspectralstats     A->A       Show frequency domain statistics about
                                   ↳ audio frames
... asplit             A->N       Pass on the audio input to N audio outp
                                   ↳ uts
.S. astats             A->A       Show time domain statistics about audio
                                   ↳ frames
..C astreamselect      N->N       Select audio streams
TSC asubboost          A->A       Boost subwoofer frequencies
TSC asubcut            A->A       Cut subwoofer frequencies
TSC asupercut          A->A       Cut super frequencies
TSC asuperpass         A->A       Apply high order Butterworth band-pass
                                   ↳ filter
TSC asuperstop         A->A       Apply high order Butterworth band-stop
                                   ↳ filter
..C atempo             A->A       Adjust audio tempo
TSC atilt              A->A       Apply spectral tilt to audio
```

```
... atrim              A->A       Pick one continuous section from the in
                                   ↳ put, drop the rest
... axcorrelate        AA->A      Cross-correlate two audio streams
... azmq               A->A       Receive commands through ZMQ and broker
                                   ↳ them to filters
TSC bandpass           A->A       Apply a two-pole Butterworth band-pass
                                   ↳ filter
TSC bandreject         A->A       Apply a two-pole Butterworth band-rejec
                                   ↳ t filter
TSC bass               A->A       Boost or cut lower frequencies
TSC biquad             A->A       Apply a biquad IIR filter with the give
                                   ↳ n coefficients
... bs2b               A->A       Bauer stereo-to-binaural filter
... channelmap         A->A       Remap audio channels
... channelsplit       A->N       Split audio into per-channel streams
... chorus             A->A       Add a chorus effect to the audio
... compand            A->A       Compress or expand audio dynamic range
T.C compensationdelay  A->A       Audio Compensation Delay Line
T.C crossfeed          A->A       Apply headphone crossfeed filter
TSC crystalizer        A->A       Simple audio noise sharpening filter
T.. dcshift            A->A       Apply a DC shift to the audio
T.. deesser            A->A       Apply de-essing to the audio
T.C dialoguenhance     A->A       Audio Dialogue Enhancement
... drmeter            A->A       Measure audio dynamic range
T.C dynaudnorm         A->A       Dynamic Audio Normalizer
... earwax             A->A       Widen the stereo image
... ebur128            A->N       EBU R128 scanner
TSC equalizer          A->A       Apply two-pole peaking equalization (EQ
                                   ↳ ) filter
T.C extrastereo        A->A       Increase difference between stereo audi
                                   ↳ o channels
..C firequalizer       A->A       Finite Impulse Response Equalizer
... flanger            A->A       Apply a flanging effect to the audio
... haas               A->A       Apply Haas Stereo Enhancer
... hdcd               A->A       Apply High Definition Compatible Digita
                                   ↳ l (HDCD) decoding
.S. headphone          N->A       Apply headphone binaural spatialization
                                   ↳ with HRTFs in additional streams
TSC highpass           A->A       Apply a high-pass filter with 3dB point
                                   ↳ frequency
TSC highshelf          A->A       Apply a high shelf filter
... join               N->A       Join multiple audio streams into multi-
                                   ↳ channel output
..C ladspa             N->A       Apply LADSPA effect
... loudnorm           A->A       EBU R128 loudness normalization
TSC lowpass            A->A       Apply a low-pass filter with 3dB point
                                   ↳ frequency
TSC lowshelf           A->A       Apply a low shelf filter
... mcompand           A->A       Multiband Compress or expand audio dyna
                                   ↳ mic range
... pan                A->A       Remix channels with coefficients (panni
                                   ↳ ng)
... replaygain         A->A       ReplayGain scanner
..C rubberband         A->A       Apply time-stretching and pitch-shiftin
                                   ↳ g
..C sidechaincompress  AA->A      Sidechain compressor
T.C sidechaingate      AA->A      Audio sidechain gate
... silencedetect      A->A       Detect silence
... silenceremove      A->A       Remove silence
.S. sofalizer          A->A       SOFAlizer (Spatially Oriented Format fo
                                   ↳ r Acoustics)
T.C speechnorm         A->A       Speech Normalizer
T.C stereotools        A->A       Apply various stereo tools
```

```
T.C stereowiden        A->A       Apply stereo widening effect
... superequalizer     A->A       Apply 18 band equalization filter
.S. surround           A->A       Apply audio surround upmix filter
TSC tiltshelf          A->A       Apply a tilt shelf filter
TSC treble             A->A       Boost or cut upper frequencies
T.. tremolo            A->A       Apply tremolo effect
T.. vibrato            A->A       Apply vibrato effect
T.C virtualbass        A->A       Audio Virtual Bass
T.C volume             A->A       Change input volume
... volumedetect       A->A       Detect audio volume
... aevalsrc           |->A       Generate an audio signal generated by a
                                   ↳ n expression
... afirsrc            |->A       Generate a FIR coefficients audio strea
                                   ↳ m
... anoisesrc          |->A       Generate a noise audio signal
... anullsrc           |->A       Null audio source, return empty audio f
                                   ↳ rames
... flite              |->A       Synthesize voice from text using libfli
                                   ↳ te
... hilbert            |->A       Generate a Hilbert transform FIR coeffi
                                   ↳ cients
... sinc               |->A       Generate a sinc kaiser-windowed low-pas
                                   ↳ s, high-pass, band-pass, or band-reje
                                   ↳ ct FIR coefficients
... sine               |->A       Generate sine wave audio signal
... anullsink          A->|       Do absolutely nothing with the input au
                                   ↳ dio
... addroi             V->V       Add region of interest to frame
... alphaextract       V->V       Extract an alpha channel as a grayscale
                                   ↳ image component
T.. alphamerge         VV->V      Copy the luma value of the second input
                                   ↳ into the alpha channel of the first
                                   ↳ input
TSC amplify            V->V       Amplify changes between successive vide
                                   ↳ o frames
... ass                V->V       Render ASS subtitles onto input video u
                                   ↳ sing the libass library
TSC atadenoise         V->V       Apply an Adaptive Temporal Averaging De
                                   ↳ noiser
T.C avgblur            V->V       Apply Average Blur filter
... avgblur_opencl     V->V       Apply average blur filter
... avgblur_vulkan     V->V       Apply avgblur mask to input video
T.C bbox               V->V       Compute bounding box for each frame
... bench              V->V       Benchmark part of a filtergraph
TSC bilateral          V->V       Apply Bilateral filter
T.. bitplanenoise      V->V       Measure bit plane noise
.S. blackdetect        V->V       Detect video intervals that are (almost
                                   ↳ ) black
... blackframe         V->V       Detect frames that are (almost) black
TSC blend              VV->V      Blend two video frames into each other
..C blend_vulkan       VV->V      Blend two video frames in Vulkan
... blockdetect        V->V       Blockdetect filter
... blurdetect         V->V       Blurdetect filter
TS. bm3d               N->V       Block-Matching 3D denoiser
T.. boxblur            V->V       Blur the input
... boxblur_opencl     V->V       Apply boxblur filter to input video
TS. bwdif              V->V       Deinterlace the input image
TSC cas                V->V       Contrast Adaptive Sharpen
... chromaber_vulkan   V->V       Offset chroma of input video (chromatic
                                   ↳ aberration)
TSC chromahold         V->V       Turns a certain color range into gray
TSC chromakey          V->V       Turns a certain color into transparency
                                   ↳ . Operates on YUV colors
```

```
... chromakey_cuda    V->V       GPU accelerated chromakey filter
TSC chromanr          V->V       Reduce chrominance noise
TSC chromashift       V->V       Shift chroma
... ciescope          V->V       Video CIE scope
T.. codecview         V->V       Visualize information about some codecs
TSC colorbalance      V->V       Adjust the color balance
TSC colorchannelmixer V->V       Adjust colors by mixing color channels
TSC colorcontrast     V->V       Adjust color contrast between RGB compo
                                  ↳ nents
TSC colorcorrect      V->V       Adjust color white balance selectively
                                  ↳ for blacks and whites
TSC colorize          V->V       Overlay a solid color on the video stre
                                  ↳ am
TSC colorkey          V->V       Turns a certain color into transparency
                                  ↳ . Operates on RGB colors
... colorkey_opencl   V->V       Turns a certain color into transparency
                                  ↳ . Operates on RGB colors
TSC colorhold         V->V       Turns a certain color range into gray.
                                  ↳ Operates on RGB colors
TSC colorlevels       V->V       Adjust the color levels
TSC colormap          VVV->V     Apply custom Color Maps to video stream
TS. colormatrix       V->V       Convert color matrix
TS. colorspace        V->V       Convert between colorspaces
TSC colortemperature  V->V       Adjust color temperature of video
TSC convolution       V->V       Apply convolution filter
... convolution_opencl V->V      Apply convolution mask to input video
TS. convolve          VV->V      Convolve first video stream with second
                                  ↳ video stream
... copy              V->V       Copy the input video unchanged to the o
                                  ↳ utput
... cover_rect        V->V       Find and cover a user specified object
..C crop              V->V       Crop the input video
T.. cropdetect        V->V       Auto-detect crop size
... cue               V->V       Delay filtering to match a cue
TSC curves            V->V       Adjust components curves
.SC datascope         V->V       Video data analysis
T.C dblur             V->V       Apply Directional Blur filter
TS. dctdnoiz          V->V       Denoise frames using 2D DCT
TSC deband            V->V       Debands video
T.C deblock           V->V       Deblock video
... decimate          N->V       Decimate frames (post field matching fi
                                  ↳ lter)
TS. deconvolve        VV->V      Deconvolve first video stream with seco
                                  ↳ nd video stream
TS. dedot             V->V       Reduce cross-luminance and cross-color
TSC deflate           V->V       Apply deflate effect
... deflicker         V->V       Remove temporal frame luminance variati
                                  ↳ ons
... deinterlace_vaapi V->V       Deinterlacing of VAAPI surfaces
... deinterlace_qsv   V->V       QuickSync video deinterlacing
... dejudder          V->V       Remove judder produced by pullup
T.. delogo            V->V       Remove logo from input video
... denoise_vaapi     V->V       VAAPI VPP for de-noise
T.. derain            V->V       Apply derain filter to the input
... deshake           V->V       Stabilize shaky video
... deshake_opencl    V->V       Feature-point based video stabilization
                                  ↳ filter
TSC despill           V->V       Despill video
... detelecine        V->V       Apply an inverse telecine pattern
TSC dilation          V->V       Apply dilation effect
... dilation_opencl   V->V       Apply dilation effect
T.. displace          VVV->V     Displace pixels
... dnn_classify      V->V       Apply DNN classify filter to the input
```

```
... dnn_detect          V->V       Apply DNN detect filter to the input
... dnn_processing      V->V       Apply DNN processing filter to the inpu
                                    ↳ t
.S. doubleweave         V->V       Weave input video fields into double nu
                                    ↳ mber of frames
T.C drawbox             V->V       Draw a colored box on the input video
... drawgraph           V->V       Draw a graph using input video metadata
T.C drawgrid            V->V       Draw a colored grid on the input video
T.C drawtext            V->V       Draw text on top of video frames using
                                    ↳ libfreetype library
T.. edgedetect          V->V       Detect and draw edge
... elbg                V->V       Apply posterize effect, using the ELBG
                                    ↳ algorithm
T.. entropy             V->V       Measure video frames entropy
.S. epx                 V->V       Scale the input using EPX algorithm
T.C eq                  V->V       Adjust brightness, contrast, gamma, and
                                    ↳ saturation
TSC erosion             V->V       Apply erosion effect
... erosion_opencl      V->V       Apply erosion effect
TSC estdif              V->V       Apply Edge Slope Tracing deinterlace
TSC exposure            V->V       Adjust exposure of the video stream
... extractplanes       V->N       Extract planes as grayscale frames
TS. fade                V->V       Fade in/out input video
..C feedback            VV->VV     Apply feedback video filter
TSC fftdnoiz            V->V       Denoise frames using 3D FFT
TS. fftfilt             V->V       Apply arbitrary expressions to pixels i
                                    ↳ n frequency domain
... field               V->V       Extract a field from the input video
... fieldhint           V->V       Field matching using hints
... fieldmatch          N->V       Field matching for inverse telecine
T.. fieldorder          V->V       Set the field order
T.C fillborders         V->V       Fill borders of the input video
... find_rect           V->V       Find a user specified object
... flip_vulkan         V->V       Flip both horizontally and vertically
T.. floodfill           V->V       Fill area with same color with another
                                    ↳ color
... format              V->V       Convert the input video to one of the s
                                    ↳ pecified pixel formats
... fps                 V->V       Force constant framerate
... framepack           VV->V      Generate a frame packed stereoscopic vi
                                    ↳ deo
.S. framerate           V->V       Upsamples or downsamples progressive so
                                    ↳ urce between specified frame rates
T.. framestep           V->V       Select one frame every N frames
... freezedetect        V->V       Detects frozen video input
... freezeframes        VV->V      Freeze video frames
T.C frei0r              V->V       Apply a frei0r effect
T.. fspp                V->V       Apply Fast Simple Post-processing filte
                                    ↳ r
TSC gblur               V->V       Apply Gaussian Blur filter
... gblur_vulkan        V->V       Gaussian Blur in Vulkan
TS. geq                 V->V       Apply generic equation to each pixel
T.. gradfun             V->V       Debands video quickly using gradients
... graphmonitor        V->V       Show various filtergraph stats
TS. grayworld           V->V       Adjust white balance using LAB gray wor
                                    ↳ ld algorithm
TS. greyedge            V->V       Estimates scene illumination by grey ed
                                    ↳ ge assumption
TSC guided              N->V       Apply Guided filter
TSC haldclut            VV->V      Adjust colors using a Hald CLUT
TS. hflip               V->V       Horizontally flip the input video
... hflip_vulkan        V->V       Horizontally flip the input video in Vu
                                    ↳ lkan
```

```
T.. histeq            V->V       Apply global color histogram equalizati
                                   ↳ on
... histogram         V->V       Compute and draw a histogram
TSC hqdn3d            V->V       Apply a High Quality 3D Denoiser
.S. hqx               V->V       Scale the input by 2, 3 or 4 using the
                                   ↳ hq*x magnification algorithm
.S. hstack            N->V       Stack video inputs horizontally
TSC hsvhold           V->V       Turns a certain HSV range into gray
TSC hsvkey            V->V       Turns a certain HSV range into transpar
                                   ↳ ency. Operates on YUV colors
T.C hue               V->V       Adjust the hue and saturation of the in
                                   ↳ put video
TSC huesaturation     V->V       Apply hue-saturation-intensity adjustme
                                   ↳ nts
... hwdownload        V->V       Download a hardware frame to a normal f
                                   ↳ rame
... hwmap             V->V       Map hardware frames
... hwupload          V->V       Upload a normal frame to a hardware fra
                                   ↳ me
... hwupload_cuda     V->V       Upload a system memory frame to a CUDA
                                   ↳ device
T.. hysteresis        VV->V      Grow first stream into second stream by
                                   ↳ connecting components
TS. identity          VV->V      Calculate the Identity between two vide
                                   ↳ o streams
... idet              V->V       Interlace detect Filter
T.C il                V->V       Deinterleave or interleave fields
TSC inflate           V->V       Apply inflate effect
... interlace         V->V       Convert progressive video into interlac
                                   ↳ ed
... interleave        N->V       Temporally interleave video inputs
... kerndeint         V->V       Apply kernel deinterlacing to the input
TSC kirsch            V->V       Apply kirsch operator
TSC lagfun            V->V       Slowly update darker pixels
T.. latency           V->V       Report video filtering latency
TSC lenscorrection    V->V       Rectify the image by correcting for len
                                   ↳ s distortion
TS. lensfun           V->V       Apply correction to an image based on i
                                   ↳ nfo derived from the lensfun database
..C libplacebo        V->V       Apply various GPU filters from libplace
                                   ↳ bo
... libvmaf           VV->V      Calculate the VMAF between two video st
                                   ↳ reams
TSC limitdiff         N->V       Apply filtering with limiting differenc
                                   ↳ e
TSC limiter           V->V       Limit pixels components to the specifie
                                   ↳ d range
... loop              V->V       Loop video frames
TSC lumakey           V->V       Turns a certain luma into transparency
TSC lut               V->V       Compute and apply a lookup table to the
                                   ↳ RGB/YUV input video
TSC lut1d             V->V       Adjust colors using a 1D LUT
TSC lut2              VV->V      Compute and apply a lookup table from t
                                   ↳ wo video inputs
TSC lut3d             V->V       Adjust colors using a 3D LUT
TSC lutrgb            V->V       Compute and apply a lookup table to the
                                   ↳ RGB input video
TSC lutyuv            V->V       Compute and apply a lookup table to the
                                   ↳ YUV input video
TSC maskedclamp       VVV->V     Clamp first stream with second stream a
                                   ↳ nd third stream
TSC maskedmax         VVV->V     Apply filtering with maximum difference
                                   ↳ of two streams
```

```
TSC maskedmerge       VVV->V     Merge first stream with second stream u
                                  ↳ sing third stream as mask
TSC maskedmin         VVV->V     Apply filtering with minimum difference
                                  ↳ of two streams
TSC maskedthreshold   VV->V      Pick pixels comparing absolute differen
                                  ↳ ce of two streams with threshold
TSC maskfun           V->V       Create Mask
TSC median            V->V       Apply Median filter
... mergeplanes       N->V       Merge planes
... mestimate         V->V       Generate motion vectors
T.. metadata          V->V       Manipulate video frame metadata
T.. midequalizer      VV->V      Apply Midway Equalization
... minterpolate      V->V       Frame rate conversion using Motion Inte
                                  ↳ rpolation
TSC mix               N->V       Mix video inputs
TSC monochrome        V->V       Convert video to gray using custom colo
                                  ↳ r filter
T.C morpho            VV->V      Apply Morphological filter
... mpdecimate        V->V       Remove near-duplicate frames
TS. msad              VV->V      Calculate the MSAD between two video st
                                  ↳ reams
TSC multiply          VV->V      Multiply first video stream with second
                                  ↳ video stream
TSC negate            V->V       Negate input video
TS. nlmeans           V->V       Non-local means denoiser
... nlmeans_opencl    V->V       Non-local means denoiser through OpenCL
TSC nnedi             V->V       Apply neural network edge directed inte
                                  ↳ rpolation intra-only deinterlacer
... noformat          V->V       Force libavfilter not to use any of the
                                  ↳ specified pixel formats for the inpu
                                  ↳ t to the next filter
TS. noise             V->V       Add noise
T.C normalize         V->V       Normalize RGB video
... null              V->V       Pass the source unchanged to the output
T.C oscilloscope      V->V       2D Video Oscilloscope
TSC overlay           VV->V      Overlay a video source on top of the in
                                  ↳ put
... overlay_opencl    VV->V      Overlay one video on top of another
... overlay_vaapi     VV->V      Overlay one video on top of another
... overlay_qsv       VV->V      Quick Sync Video overlay
... overlay_vulkan    VV->V      Overlay a source on top of another
... overlay_cuda      VV->V      Overlay one video on top of another usi
                                  ↳ ng CUDA
T.. owdenoise         V->V       Denoise using wavelets
... pad               V->V       Pad the input video
... pad_opencl        V->V       Pad the input video
... palettegen        V->V       Find the optimal palette for a given st
                                  ↳ ream
... paletteuse        VV->V      Use a palette to downsample an input vi
                                  ↳ deo stream
T.C perms             V->V       Set permissions for the output video fr
                                  ↳ ame
TS. perspective       V->V       Correct the perspective of video
T.C phase             V->V       Phase shift fields
... photosensitivity  V->V       Filter out photosensitive epilepsy seiz
                                  ↳ ure-inducing flashes
... pixdesctest       V->V       Test pixel format definitions
TSC pixelize          V->V       Pixelize video
T.C pixscope          V->V       Pixel data analysis
T.C pp                V->V       Filter video using libpostproc
T.. pp7               V->V       Apply Postprocessing 7 filter
TS. premultiply       N->V       PreMultiply first stream with first pla
                                  ↳ ne of second stream
```

```
TSC prewitt           V->V       Apply prewitt operator
... prewitt_opencl    V->V       Apply prewitt operator
... procamp_vaapi     V->V       ProcAmp (color balance) adjustments for
                                  ↳ hue, saturation, brightness, contrast
... program_opencl    N->V       Filter video using an OpenCL program
TSC pseudocolor       V->V       Make pseudocolored video frames
TS. psnr              VV->V      Calculate the PSNR between two video st
                                  ↳ reams
... pullup            V->V       Pullup from field sequence to frames
T.. qp                V->V       Change video quantization parameters
... random            V->V       Return random frames
TSC readeia608        V->V       Read EIA-608 Closed Caption codes from
                                  ↳ input video and write them to frame m
                                  ↳ etadata
... readvitc          V->V       Read vertical interval timecode and wri
                                  ↳ te it to frame metadata
..C realtime          V->V       Slow down filtering to match realtime
.S. remap             VVV->V     Remap pixels
... remap_opencl      VVV->V     Remap pixels using OpenCL
TS. removegrain       V->V       Remove grain
T.. removelogo        V->V       Remove a TV logo based on a mask image
... repeatfields      V->V       Hard repeat fields based on MPEG repeat
                                  ↳ field flag
... reverse           V->V       Reverse a clip
TSC rgbashift         V->V       Shift RGBA
TSC roberts           V->V       Apply roberts cross operator
... roberts_opencl    V->V       Apply roberts operator
TSC rotate            V->V       Rotate the input image
T.. sab               V->V       Apply shape adaptive blur
..C scale             V->V       Scale the input video size and/or conve
                                  ↳ rt the image format
... scale_vaapi       V->V       Scale to/from VAAPI surfaces
... scale_cuda        V->V       GPU accelerated video resizer
... scale_qsv         V->V       QuickSync video scaling and format conv
                                  ↳ ersion
... scale_vulkan      V->V       Scale Vulkan frames
..C scale2ref         VV->VV     Scale the input video size and/or conve
                                  ↳ rt the image format to the given refe
                                  ↳ rence
... scdet             V->V       Detect video scene change
TSC scharr            V->V       Apply scharr operator
TSC scroll            V->V       Scroll input video
... segment           V->N       Segment video stream
... select            V->N       Select video frames to pass in output
TS. selectivecolor    V->V       Apply CMYK adjustments to specific colo
                                  ↳ r ranges
... sendcmd           V->V       Send commands to filters
... separatefields    V->V       Split input video frames into fields
... setdar            V->V       Set the frame display aspect ratio
... setfield          V->V       Force field for the output video frame
... setparams         V->V       Force field, or color property for the
                                  ↳ output video frame
... setpts            V->V       Set PTS for the output video frame
... setrange          V->V       Force color range for the output video
                                  ↳ frame
... setsar            V->V       Set the pixel sample aspect ratio
... settb             V->V       Set timebase for the video output link
... sharpness_vaapi   V->V       VAAPI VPP for sharpness
TSC shear             V->V       Shear transform the input image
... showinfo          V->V       Show textual information for each video
                                  ↳ frame
... showpalette       V->V       Display frame palette
T.. shuffleframes     V->V       Shuffle video frames
```

```
TS. shufflepixels     V->V       Shuffle video pixels
T.. shuffleplanes     V->V       Shuffle video planes
T.. sidedata          V->V       Manipulate video frame side data
.S. signalstats       V->V       Generate statistics from video analysis
... signature         N->V       Calculate the MPEG-7 video signature
... siti              V->V       Calculate spatial information (SI) and
                                  ↳ temporal information (TI)
T.. smartblur         V->V       Blur the input video without impacting
                                  ↳ the outlines
TSC sobel             V->V       Apply sobel operator
... sobel_opencl      V->V       Apply sobel operator
... split             V->N       Pass on the input to N video outputs
T.C spp               V->V       Apply a simple post processing filter
... sr                V->V       Apply DNN-based image super resolution
                                  ↳ to the input
TS. ssim              VV->V      Calculate the SSIM between two video st
                                  ↳ reams
.S. stereo3d          V->V       Convert video stereoscopic 3D view
..C streamselect      N->N       Select video streams
... subtitles         V->V       Render text subtitles onto input video
                                  ↳ using the libass library
.S. super2xsai        V->V       Scale the input by 2x using the Super2x
                                  ↳ SaI pixel art algorithm
T.C swaprect          V->V       Swap 2 rectangular objects in video
T.. swapuv            V->V       Swap U and V components
TSC tblend            V->V       Blend successive frames
... telecine          V->V       Apply a telecine pattern
... thistogram        V->V       Compute and draw a temporal histogram
TSC threshold         VVVV->V    Threshold first video stream using othe
                                  ↳ r video streams
T.. thumbnail         V->V       Select the most representative frame in
                                  ↳ a given sequence of consecutive frames
... thumbnail_cuda    V->V       Select the most representative frame in
                                  ↳ a given sequence of consecutive frames
... tile              V->V       Tile several successive frames together
... tinterlace        V->V       Perform temporal field interlacing
TSC tlut2             V->V       Compute and apply a lookup table from t
                                  ↳ wo successive frames
TSC tmedian           V->V       Pick median pixels from successive fram
                                  ↳ es
T.. tmidequalizer     V->V       Apply Temporal Midway Equalization
TSC tmix              V->V       Mix successive video frames
.S. tonemap           V->V       Conversion to/from different dynamic ra
                                  ↳ nges
... tonemap_opencl    V->V       Perform HDR to SDR conversion with tone
                                  ↳ mapping
... tonemap_vaapi     V->V       VAAPI VPP for tone-mapping
... tpad              V->V       Temporarily pad video frames
.S. transpose         V->V       Transpose input video
... transpose_opencl  V->V       Transpose input video
... transpose_vaapi   V->V       VAAPI VPP for transpose
... transpose_vulkan  V->V       Transpose Vulkan Filter
... trim              V->V       Pick one continuous section from the in
                                  ↳ put, drop the rest
TS. unpremultiply     N->V       UnPreMultiply first stream with first p
                                  ↳ lane of second stream
TS. unsharp           V->V       Sharpen or blur the input video
... unsharp_opencl    V->V       Apply unsharp mask to input video
... untile            V->V       Untile a frame into a sequence of frame
                                  ↳ s
.SC v360              V->V       Convert 360 projection of video
T.. vaguedenoiser     V->V       Apply a Wavelet based Denoiser
TSC varblur           VV->V      Apply Variable Blur filter
```

```
..C vectorscope       V->V       Video vectorscope
T.. vflip             V->V       Flip the input video vertically
... vflip_vulkan      V->V       Vertically flip the input video in Vulk
                                  ↳ an
... vfrdet            V->V       Variable frame rate detect filter
TSC vibrance          V->V       Boost or alter saturation
... vidstabdetect     V->V       Extract relative transformations, pass
                                  ↳ 1 of 2 for stabilization (see vidstab
                                  ↳ transform for pass 2)
... vidstabtransform  V->V       Transform the frames, pass 2 of 2 for s
                                  ↳ tabilization (see vidstabdetect for p
                                  ↳ ass 1)
TS. vif               VV->V      Calculate the VIF between two video str
                                  ↳ eams
T.. vignette          V->V       Make or reverse a vignette effect
... vmafmotion        V->V       Calculate the VMAF Motion score
... vpp_qsv           V->V       Quick Sync Video VPP
.S. vstack            N->V       Stack video inputs vertically
TSC w3fdif            V->V       Apply Martin Weston three field deinter
                                  ↳ lace
.SC waveform          V->V       Video waveform monitor
.S. weave             V->V       Weave input video fields into frames
.S. xbr               V->V       Scale the input using xBR algorithm
TS. xcorrelate        VV->V      Cross-correlate first video stream with
                                  ↳ second video stream
.S. xfade             VV->V      Cross fade one video with another video
... xfade_opencl      VV->V      Cross fade one video with another video
TSC xmedian           N->V       Pick median pixels from several video i
                                  ↳ nputs
.S. xstack            N->V       Stack video inputs into custom layout
TS. yadif             V->V       Deinterlace the input image
T.. yadif_cuda        V->V       Deinterlace CUDA frames
TSC yaepblur          V->V       Yet another edge preserving blur filter
... zmq               V->V       Receive commands through ZMQ and broker
                                  ↳ them to filters
... zoompan           V->V       Apply Zoom & Pan effect
.SC zscale            V->V       Apply resizing, colorspace and bit dept
                                  ↳ h conversion
... allrgb            |->V       Generate all RGB colors
... allyuv            |->V       Generate all yuv colors
... cellauto          |->V       Create pattern generated by an elementa
                                  ↳ ry cellular automaton
..C color             |->V       Provide an uniformly colored input
... colorchart        |->V       Generate color checker chart
... colorspectrum     |->V       Generate colors spectrum
... ddagrab           |->V       Grab Windows Desktop images using Deskt
                                  ↳ op Duplication API
... frei0r_src        |->V       Generate a frei0r source
.S. gradients         |->V       Draw a gradients
... haldclutsrc       |->V       Provide an identity Hald CLUT
... life              |->V       Create life
... mandelbrot        |->V       Render a Mandelbrot fractal
... mptestsrc         |->V       Generate various test pattern
... nullsrc           |->V       Null video source, return unprocessed v
                                  ↳ ideo frames
... openclsrc         |->V       Generate video using an OpenCL program
... pal75bars         |->V       Generate PAL 75% color bars
... pal100bars        |->V       Generate PAL 100% color bars
... rgbtestsrc        |->V       Generate RGB test pattern
.S. sierpinski        |->V       Render a Sierpinski fractal
... smptebars         |->V       Generate SMPTE color bars
... smptehdbars       |->V       Generate SMPTE HD color bars
... testsrc           |->V       Generate test pattern
```

```
... testsrc2           |->V       Generate another test pattern
... yuvtestsrc         |->V       Generate YUV test pattern
... nullsink           V->|       Do absolutely nothing with the input vi
                                   ↳ deo
... abitscope          A->V       Convert input audio to audio bit scope
                                   ↳ video output
... adrawgraph         A->V       Draw a graph using input audio metadata
... agraphmonitor      A->V       Show various filtergraph stats
... ahistogram         A->V       Convert input audio to histogram video
                                   ↳ output
... aphasemeter        A->N       Convert input audio to phase meter vide
                                   ↳ o output
.SC avectorscope       A->V       Convert input audio to vectorscope vide
                                   ↳ o output
..C concat             N->N       Concatenate audio and video streams
... showcqt            A->V       Convert input audio to a CQT (Constant/
                                   ↳ Clamped Q Transform) spectrum video o
                                   ↳ utput
... showfreqs          A->V       Convert input audio to a frequencies vi
                                   ↳ deo output
.S. showspatial        A->V       Convert input audio to a spatial video
                                   ↳ output
.S. showspectrum       A->V       Convert input audio to a spectrum video
                                   ↳ output
.S. showspectrumpic    A->V       Convert input audio to a spectrum video
                                   ↳ output single picture
... showvolume         A->V       Convert input audio volume to video out
                                   ↳ put
... showwaves          A->V       Convert input audio to a video output
... showwavespic       A->V       Convert input audio to a video output s
                                   ↳ ingle picture
... spectrumsynth      VV->A      Convert input spectrum videos to audio
                                   ↳ output
... avsynctest         |->AV      Generate an Audio Video Sync Test
..C amovie             |->N       Read audio from a movie source
..C movie              |->N       Read from a movie source
... afifo              A->A       Buffer input frames and send them when
                                   ↳ they are requested
... fifo               V->V       Buffer input images and send them when
                                   ↳ they are requested
... abuffer            |->A       Buffer audio frames, and make them acce
                                   ↳ ssible to the filterchain
... buffer             |->V       Buffer video frames, and make them acce
                                   ↳ ssible to the filterchain
... abuffersink        A->|       Buffer audio frames, and make them avai
                                   ↳ lable to the end of the filter graph
... buffersink         V->|       Buffer video frames, and make them avai
                                   ↳ lable to the end of the filter graph
```

ANNEXURE 5:
Sample list of formats

This annexure contains sample output for the command `ffmpeg -formats`.

```
File formats:
 D. = Demuxing supported
 .E = Muxing supported
 --
 D  3dostr          3DO STR
  E 3g2             3GP2 (3GPP2 file format)
  E 3gp             3GP (3GPP file format)
 D  4xm             4X Technologies
  E a64             a64 - video for Commodore 64
 D  aa              Audible AA format files
 D  aac             raw ADTS AAC (Advanced Audio Coding)
 D  aax             CRI AAX
 DE ac3             raw AC-3
 D  ace             tri-Ace Audio Container
 D  acm             Interplay ACM
 D  act             ACT Voice file format
 D  adf             Artworx Data Format
 D  adp             ADP
 D  ads             Sony PS2 ADS
  E adts            ADTS AAC (Advanced Audio Coding)
 DE adx             CRI ADX
 D  aea             MD STUDIO audio
 D  afc             AFC
 DE aiff            Audio IFF
 D  aix             CRI AIX
 DE alaw            PCM A-law
 D  alias_pix       Alias/Wavefront PIX image
 DE alp             LEGO Racers ALP
 DE alsa            ALSA audio output
 DE amr             3GPP AMR
 D  amrnb           raw AMR-NB
 D  amrwb           raw AMR-WB
  E amv             AMV
 D  anm             Deluxe Paint Animation
 D  apc             CRYO APC
 D  ape             Monkey's Audio
 DE apm             Ubisoft Rayman 2 APM
 DE apng            Animated Portable Network Graphics
 DE aptx            raw aptX (Audio Processing Technology for Bluetooth)
 DE aptx_hd         raw aptX HD (Audio Processing Technology for Bluetoo
                    ↳ th)
 D  aqtitle         AQTitle subtitles
 DE argo_asf        Argonaut Games ASF
 D  argo_brp        Argonaut Games BRP
 DE argo_cvg        Argonaut Games CVG
 DE asf             ASF (Advanced / Active Streaming Format)
 D  asf_o           ASF (Advanced / Active Streaming Format)
```

```
 E asf_stream      ASF (Advanced / Active Streaming Format)
DE ass             SSA (SubStation Alpha) subtitle
DE ast             AST (Audio Stream)
DE au              Sun AU
D  av1             AV1 Annex B
DE avi             AVI (Audio Video Interleaved)
 E avif            AVIF
D  avisynth        AviSynth script
 E avm2            SWF (ShockWave Flash) (AVM2)
D  avr             AVR (Audio Visual Research)
D  avs             Argonaut Games Creature Shock
DE avs2            raw AVS2-P2/IEEE1857.4 video
DE avs3            AVS3-P2/IEEE1857.10
D  bethsoftvid     Bethesda Softworks VID
D  bfi             Brute Force & Ignorance
D  bfstm           BFSTM (Binary Cafe Stream)
D  bin             Binary text
D  bink            Bink
D  binka           Bink Audio
DE bit             G.729 BIT file format
D  bitpacked       Bitpacked
D  bmp_pipe        piped bmp sequence
D  bmv             Discworld II BMV
D  boa             Black Ops Audio
D  brender_pix     BRender PIX image
D  brstm           BRSTM (Binary Revolution Stream)
D  c93             Interplay C93
 E caca            caca (color ASCII art) output device
DE caf             Apple CAF (Core Audio Format)
DE cavsvideo       raw Chinese AVS (Audio Video Standard) video
D  cdg             CD Graphics
D  cdxl            Commodore CDXL video
 E chromaprint     Chromaprint
D  cine            Phantom Cine
DE codec2          codec2 .c2 muxer
DE codec2raw       raw codec2 muxer
D  concat          Virtual concatenation script
 E crc             CRC testing
D  cri_pipe        piped cri sequence
DE dash            DASH Muxer
DE data            raw data
DE daud            D-Cinema audio
D  dcstr           Sega DC STR
D  dds_pipe        piped dds sequence
D  derf            Xilam DERF
D  dfa             Chronomaster DFA
DE dfpwm           raw DFPWM1a
D  dhav            Video DAV
DE dirac           raw Dirac
DE dnxhd           raw DNxHD (SMPTE VC-3)
D  dpx_pipe        piped dpx sequence
D  dsf             DSD Stream File (DSF)
D  dshow           DirectShow capture
D  dsicin          Delphine Software International CIN
D  dss             Digital Speech Standard (DSS)
DE dts             raw DTS
D  dtshd           raw DTS-HD
DE dv              DV (Digital Video)
D  dvbsub          raw dvbsub
D  dvbtxt          dvbtxt
 E dvd             MPEG-2 PS (DVD VOB)
D  dxa             DXA
D  ea              Electronic Arts Multimedia
```

```
 D  ea_cdata        Electronic Arts cdata
DE eac3             raw E-AC-3
 D  epaf           Ensoniq Paris Audio File
 D  exr_pipe       piped exr sequence
DE f32be            PCM 32-bit floating-point big-endian
DE f32le            PCM 32-bit floating-point little-endian
 E f4v              F4V Adobe Flash Video
DE f64be            PCM 64-bit floating-point big-endian
DE f64le            PCM 64-bit floating-point little-endian
DE fbdev            Linux framebuffer
DE ffmetadata       FFmpeg metadata in text
 E fifo             FIFO queue pseudo-muxer
 E fifo_test        Fifo test muxer
DE film_cpk         Sega FILM / CPK
DE filmstrip        Adobe Filmstrip
DE fits             Flexible Image Transport System
DE flac             raw FLAC
 D  flic           FLI/FLC/FLX animation
DE flv              FLV (Flash Video)
 E framecrc         framecrc testing
 E framehash        Per-frame hash testing
 E framemd5         Per-frame MD5 testing
 D  frm            Megalux Frame
 D  fsb            FMOD Sample Bank
 D  fwse           Capcom's MT Framework sound
DE g722             raw G.722
DE g723_1           raw G.723.1
DE g726             raw big-endian G.726 ("left-justified")
DE g726le           raw little-endian G.726 ("right-justified")
 D  g729           G.729 raw format demuxer
 D  gdigrab        GDI API Windows frame grabber
 D  gdv            Gremlin Digital Video
 D  gem_pipe       piped gem sequence
 D  genh           GENeric Header
DE gif              CompuServe Graphics Interchange Format (GIF)
 D  gif_pipe       piped gif sequence
DE gsm              raw GSM
DE gxf              GXF (General eXchange Format)
DE h261             raw H.261
DE h263             raw H.263
DE h264             raw H.264 video
 E hash             Hash testing
 D  hca            CRI HCA
 D  hcom           Macintosh HCOM
 D  hdr_pipe       piped hdr sequence
 E hds              HDS Muxer
DE hevc             raw HEVC video
DE hls              Apple HTTP Live Streaming
 D  hnm            Cryo HNM v4
DE ico              Microsoft Windows ICO
 D  idcin          id Cinematic
 D  idf            iCE Draw File
 D  iff            IFF (Interchange File Format)
 D  ifv            IFV CCTV DVR
DE ilbc             iLBC storage
DE image2           image2 sequence
DE image2pipe       piped image2 sequence
 D  imf            IMF (Interoperable Master Format)
 D  ingenient      raw Ingenient MJPEG
 D  ipmovie        Interplay MVE
 E ipod             iPod H.264 MP4 (MPEG-4 Part 14)
 D  ipu            raw IPU Video
DE ircam            Berkeley/IRCAM/CARL Sound Format
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 E ismv            ISMV/ISMA (Smooth Streaming)
D  iss             Funcom ISS
D  iv8             IndigoVision 8000 video
DE ivf             On2 IVF
D  ivr             IVR (Internet Video Recording)
D  j2k_pipe        piped j2k sequence
DE jacosub         JACOsub subtitle format
D  jpeg_pipe       piped jpeg sequence
D  jpegls_pipe     piped jpegls sequence
D  jpegxl_pipe     piped jpegxl sequence
D  jv              Bitmap Brothers JV
D  kux             KUX (YouKu)
DE kvag            Simon & Schuster Interactive VAG
 E latm            LOAS/LATM
D  lavfi           Libavfilter virtual input device
D  libcdio
D  libgme          Game Music Emu demuxer
D  libmodplug      ModPlug demuxer
D  libopenmpt      Tracker formats (libopenmpt)
D  live_flv        live RTMP FLV (Flash Video)
D  lmlm4           raw lmlm4
D  loas            LOAS AudioSyncStream
DE lrc             LRC lyrics
D  luodat          Video CCTV DAT
D  lvf             LVF
D  lxf             VR native stream (LXF)
DE m4v             raw MPEG-4 video
 E matroska        Matroska
D  matroska,webm   Matroska / WebM
D  mca             MCA Audio Format
D  mcc             MacCaption
 E md5             MD5 testing
D  mgsts           Metal Gear Solid: The Twin Snakes
DE microdvd        MicroDVD subtitle format
DE mjpeg           raw MJPEG video
D  mjpeg_2000      raw MJPEG 2000 video
 E mkvtimestamp_v2 extract pts as timecode v2 format, as defined by mkv
                   ↳ toolnix
DE mlp             raw MLP
D  mlv             Magic Lantern Video (MLV)
D  mm              American Laser Games MM
DE mmf             Yamaha SMAF
D  mods            MobiClip MODS
D  moflex          MobiClip MOFLEX
 E mov             QuickTime / MOV
D  mov,mp4,m4a,3gp,3g2,mj2 QuickTime / MOV
 E mp2             MP2 (MPEG audio layer 2)
DE mp3             MP3 (MPEG audio layer 3)
 E mp4             MP4 (MPEG-4 Part 14)
D  mpc             Musepack
D  mpc8            Musepack SV8
DE mpeg            MPEG-1 Systems / MPEG program stream
 E mpeg1video      raw MPEG-1 video
 E mpeg2video      raw MPEG-2 video
DE mpegts          MPEG-TS (MPEG-2 Transport Stream)
D  mpegtsraw       raw MPEG-TS (MPEG-2 Transport Stream)
D  mpegvideo       raw MPEG video
DE mpjpeg          MIME multipart JPEG
D  mpl2            MPL2 subtitles
D  mpsub           MPlayer subtitles
D  msf             Sony PS3 MSF
D  msnwctcp        MSN TCP Webcam stream
D  msp             Microsoft Paint (MSP))
```

```
 D  mtaf            Konami PS2 MTAF
 D  mtv             MTV
 DE mulaw           PCM mu-law
 D  musx            Eurocom MUSX
 D  mv              Silicon Graphics Movie
 D  mvi             Motion Pixels MVI
 DE mxf             MXF (Material eXchange Format)
  E mxf_d10         MXF (Material eXchange Format) D-10 Mapping
  E mxf_opatom      MXF (Material eXchange Format) Operational Pattern A
                    ↳ tom
 D  mxg             MxPEG clip
 D  nc              NC camera feed
 D  nistsphere      NIST SPeech HEader REsources
 D  nsp             Computerized Speech Lab NSP
 D  nsv             Nullsoft Streaming Video
  E null            raw null video
 DE nut             NUT
 D  nuv             NuppelVideo
 DE obu             AV1 low overhead OBU
  E oga             Ogg Audio
 DE ogg             Ogg
  E ogv             Ogg Video
 DE oma             Sony OpenMG audio
  E opengl          OpenGL output
  E opus            Ogg Opus
 DE oss             OSS (Open Sound System) playback
 D  paf             Amazing Studio Packed Animation File
 D  pam_pipe        piped pam sequence
 D  pbm_pipe        piped pbm sequence
 D  pcx_pipe        piped pcx sequence
 D  pfm_pipe        piped pfm sequence
 D  pgm_pipe        piped pgm sequence
 D  pgmyuv_pipe     piped pgmyuv sequence
 D  pgx_pipe        piped pgx sequence
 D  phm_pipe        piped phm sequence
 D  photocd_pipe    piped photocd sequence
 D  pictor_pipe     piped pictor sequence
 D  pjs             PJS (Phoenix Japanimation Society) subtitles
 D  pmp             Playstation Portable PMP
 D  png_pipe        piped png sequence
 D  pp_bnk          Pro Pinball Series Soundbank
 D  ppm_pipe        piped ppm sequence
 D  psd_pipe        piped psd sequence
  E psp             PSP MP4 (MPEG-4 Part 14)
 D  psxstr          Sony Playstation STR
 DE pulse           Pulse audio output
 D  pva             TechnoTrend PVA
 D  pvf             PVF (Portable Voice Format)
 D  qcp             QCP
 D  qdraw_pipe      piped qdraw sequence
 D  qoi_pipe        piped qoi sequence
 D  r3d             REDCODE R3D
 DE rawvideo        raw video
 D  realtext        RealText subtitle format
 D  redspark        RedSpark
 D  rl2             RL2
 DE rm              RealMedia
 DE roq             raw id RoQ
 D  rpl             RPL / ARMovie
 D  rsd             GameCube RSD
 DE rso             Lego Mindstorms RSO
 DE rtp             RTP output
  E rtp_mpegts      RTP/mpegts output format
```

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 DE rtsp            RTSP output
 DE s16be           PCM signed 16-bit big-endian
 DE s16le           PCM signed 16-bit little-endian
 DE s24be           PCM signed 24-bit big-endian
 DE s24le           PCM signed 24-bit little-endian
 DE s32be           PCM signed 32-bit big-endian
 DE s32le           PCM signed 32-bit little-endian
 D  s337m           SMPTE 337M
 DE s8              PCM signed 8-bit
 D  sami            SAMI subtitle format
 DE sap             SAP output
 DE sbc             raw SBC
 D  sbg             SBaGen binaural beats script
 DE scc             Scenarist Closed Captions
 D  scd             Square Enix SCD
  E sdl,sdl2        SDL2 output device
 D  sdp             SDP
 D  sdr2            SDR2
 D  sds             MIDI Sample Dump Standard
 D  sdx             Sample Dump eXchange
  E segment         segment
 D  ser             SER (Simple uncompressed video format for astronomic
                    ↳ al capturing)
 D  sga             Digital Pictures SGA
 D  sgi_pipe        piped sgi sequence
 D  shn             raw Shorten
 D  siff            Beam Software SIFF
 D  simbiosis_imx   Simbiosis Interactive IMX
 D  sln             Asterisk raw pcm
 DE smjpeg          Loki SDL MJPEG
 D  smk             Smacker
  E smoothstreaming Smooth Streaming Muxer
 D  smush           LucasArts Smush
 DE sndio           sndio audio playback
 D  sol             Sierra SOL
 DE sox             SoX native
 DE spdif           IEC 61937 (used on S/PDIF - IEC958)
  E spx             Ogg Speex
 DE srt             SubRip subtitle
 D  stl             Spruce subtitle format
  E stream_segment,ssegment streaming segment muxer
  E streamhash      Per-stream hash testing
 D  subviewer       SubViewer subtitle format
 D  subviewer1      SubViewer v1 subtitle format
 D  sunrast_pipe    piped sunrast sequence
 DE sup             raw HDMV Presentation Graphic Stream subtitles
 D  svag            Konami PS2 SVAG
  E svcd            MPEG-2 PS (SVCD)
 D  svg_pipe        piped svg sequence
 D  svs             Square SVS
 DE swf             SWF (ShockWave Flash)
 D  tak             raw TAK
 D  tedcaptions     TED Talks captions
  E tee             Multiple muxer tee
 D  thp             THP
 D  tiertexseq      Tiertex Limited SEQ
 D  tiff_pipe       piped tiff sequence
 D  tmv             8088flex TMV
 DE truehd          raw TrueHD
 DE tta             TTA (True Audio)
  E ttml            TTML subtitle
 D  tty             Tele-typewriter
 D  txd             Renderware TeXture Dictionary
```

```
 D  ty              TiVo TY Stream
 DE u16be           PCM unsigned 16-bit big-endian
 DE u16le           PCM unsigned 16-bit little-endian
 DE u24be           PCM unsigned 24-bit big-endian
 DE u24le           PCM unsigned 24-bit little-endian
 DE u32be           PCM unsigned 32-bit big-endian
 DE u32le           PCM unsigned 32-bit little-endian
 DE u8              PCM unsigned 8-bit
  E uncodedframecrc uncoded framecrc testing
 D  v210            Uncompressed 4:2:2 10-bit
 D  v210x           Uncompressed 4:2:2 10-bit
 D  vag             Sony PS2 VAG
 D  vbn_pipe        piped vbn sequence
 DE vc1             raw VC-1 video
 DE vc1test         VC-1 test bitstream
  E vcd             MPEG-1 Systems / MPEG program stream (VCD)
 D  vfwcap          VfW video capture
 DE vidc            PCM Archimedes VIDC
 DE video4linux2,v4l2 Video4Linux2 output device
 D  vividas         Vividas VIV
 D  vivo            Vivo
 D  vmd             Sierra VMD
  E vob             MPEG-2 PS (VOB)
 D  vobsub          VobSub subtitle format
 DE voc             Creative Voice
 D  vpk             Sony PS2 VPK
 D  vplayer         VPlayer subtitles
 D  vqf             Nippon Telegraph and Telephone Corporation (NTT) Twi
                    ↳ nVQ
 DE w64             Sony Wave64
 DE wav             WAV / WAVE (Waveform Audio)
 D  wc3movie        Wing Commander III movie
  E webm            WebM
  E webm_chunk      WebM Chunk Muxer
 DE webm_dash_manifest WebM DASH Manifest
  E webp            WebP
 D  webp_pipe       piped webp sequence
 DE webvtt          WebVTT subtitle
 DE wsaud           Westwood Studios audio
 D  wsd             Wideband Single-bit Data (WSD)
 D  wsvqa           Westwood Studios VQA
 DE wtv             Windows Television (WTV)
 DE wv              raw WavPack
 D  wve             Psion 3 audio
 D  x11grab         X11 screen capture, using XCB
 D  xa              Maxis XA
 D  xbin            eXtended BINary text (XBIN)
 D  xbm_pipe        piped xbm sequence
 D  xmv             Microsoft XMV
 D  xpm_pipe        piped xpm sequence
  E xv              XV (XVideo) output device
 D  xvag            Sony PS3 XVAG
 D  xwd_pipe        piped xwd sequence
 D  xwma            Microsoft xWMA
 D  yop             Psygnosis YOP
 DE yuv4mpegpipe    YUV4MPEG pipe
```

Books By V. Subhash

I invite you to visit my site **WWW.VSUBHASH.IN**, and check out my other books, special discounts, sample PDFs and full ebooks. In 2020, I started publishing books. For two decades before that, I have been publishing feature articles, free ebooks (old editions still available), software (server/desktop/mobile), reviews (books, films, music and travel), funny memes and cartoons. You can follow these adventures on my blog: **http://www.vsubhash.in/blogs/blog/index.html**

My books for children are under the pseudonym **Ólafía L. Óla** (because it has laugh and LOL).

2020 Fresh Clean Jokes For Everyone

This is one of the biggest jokebooks ever written - over 3200 jokes spread over:

- ***Part 1 — For Learning*** (computer jokes, programming jokes, physics jokes, chemistry jokes, biology jokes, medical jokes, financial jokes, geography jokes, pun jokes and THREE CHAPTERS DEVOTED TO FOREIGN LANGUAGES)
- ***Part 2 — For Fun*** (bar jokes, blonde jokes, cross-the-road jokes, knock-knock jokes, lightbulb jokes, knock-knock jokes, romantic (breakup) jokes)
- ***Part 3 — Only For Intellectuals*** (jokes about philosophy, advertising, news and politics)

It has lots of jokes purely for the hedonist consumption of humour, content to improve vocabulary and general knowledge, thought-provoking poems (mostly as financial/political limericks set to the tune of popular nursery rhymes) AND some of the best one-liners EVER written in English. Absolutely no (_ ˠ _) humour.

• Pages: 292 • Paperback: $10 • Ebook: An older subset with 420 jokes is available for **FREE**

2020 Fresh Clean Jokes For Kids

This 'for kids' subset of the 2020 jokebook has over 2200 jokes. It has all of *Part 1 (For Learning)* and some non-political jokes from *Part 2 (For Fun)* & *Part 3 (Only For Intellectuals)*. Joke types include computer jokes, programming jokes, cross-the-road jokes, physics jokes, chemistry jokes, biology jokes, medical jokes, financial jokes, geography jokes, knock-knock jokes, breakup jokes...). Special chapters include *Elephant & Ant Jokes* , *Off-The-Wall Philosophers*, *Useful French Phrases* , *Useful Latin Phrases*, *Other Useful Foreign Phrases* , *Jokes You Love To Hate* , *Jokes In Advertising* , and *Fancy Creature Jokes* . No political or controversial jokes. Absolutely no (_ ˠ _) humour.

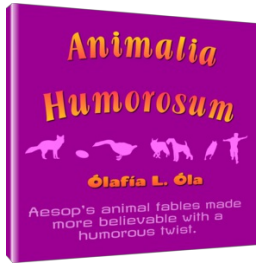
• Pages: 166 • Paperback: ₹550 or $7.70 • Ebook: Will never be published

Ólafía L. Óla's Favourite Traditional Nursery Rhymes (Illustrated)

The political correctness pandemic has caused many nursery rhymes to be rewritten or eliminated altogether. This illustrated children's book has **50 popular English nursery rhymes in their traditional form**. The selected rhymes have stood the test of time and this **large-print paperback with edge-to-edge colour** makes it easy for kids to read them.

• Pages: 44 (39 with real content) • Colour Paperback: $9 • Ebook: $2

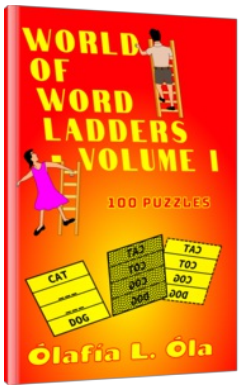
Animalia Humorosum

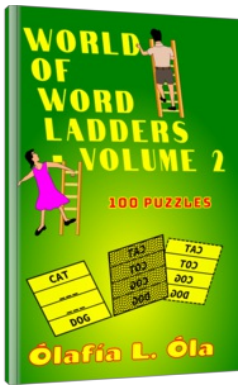


This is an illustrated children's storybook based on Aesop's Fables. The stories have been made more believable by changing the ending with a humorous twist. **The book is a large-print paperback with edge-to-edge colour**.

• Pages: 30 (26 with real content) • Colour Paperback: $9 • Ebook (for parental review): ₹70 or $2 or **FREE**

World of Word Ladders



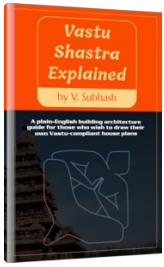


Word ladders are a wonderful pastime. These puzzles are neither tough nor easy. They have the right balance between exercising the brain and having fun. Word ladders can challenge a kid's thinking ability, spelling skills and vocabulary. For an adult, word ladders are pure fun. A word ladder has a diagram of a ladder with a word on both the first and last rungs. You need to change only one letter in the blank middle rungs so that the first word is transformed into the last word. Next to each word ladder is its solution. The solution is obscured to protect the challenge. Here are some examples:

- **C-A-T** » *C-O-T* » *C-O-G* » **D-O-G**
- **L-A-S-T** » *L-O-S-T* » *L-O-S-E* » *H-O-S-E* » **H-O-P-E**

• Puzzles: 100 • Paperback: $6 (per volume)

Vastu Shastra Explained

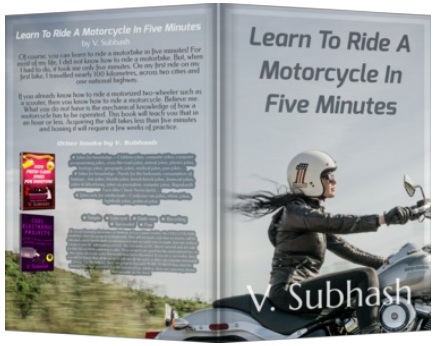


This is a plain-English Vástu Śastra building-architecture guide for those who wish to draw their own Vastu-compliant house plans. The book does not upsell Vaastu as a panacea for all ills nor does it portray Vastu as the Indian Feng Shui. Instead, it presents Vastu as a collection of time-tested best-practices in Indian building architecture.

This book is based on the *Vastu Shastra* given in *Matsya Purana* . A PDF containing the original English translation is available for free on my website.

• Pages: 38 (31 with real content) • Colour Paperback: $7.77 • Ebook: ₹100 or $6

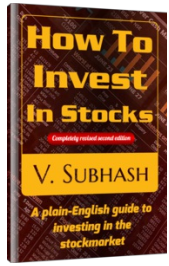
Learn To Ride A Motorcycle In Five Minutes



Yes, you can! For most of my life, I did not know how to ride a motorbike. But, when I had to do, it took me only five minutes. On my first ride on my first bike, I travelled nearly 100 kilometres, across two cities and one national highway. Acquiring the skill takes less than five minutes and honing it will require a few weeks.

• Pages: 40 (30 with real content)
• Paperback: $7.70 • Ebook: ₹100 or $6

How To Invest In Stocks, 2nd Edition



The first edition book was written in 2003 for the Indian stockmarket. It was popular around the world because it was a plain-English guide to investing in the stockmarket. The 2020 completely revised second edition maintains the original premise but has a global focus, updated information and new chapters. **It has some useful 'extra' information that you will not find in any investment book and no business school will teach you.** Mere book knowledge about stockmarkets will not help you understand the markets. Markets are influenced by news and information (there is a difference).

• Pages: 94 • Paperback: $9.90 • Ebook: ₹100 or $3

Email Newsletter Strategies For Profit

An organically grown mailing list is an invaluable resource for your business. It is your own social network. You need to nurture it like a baby. This book not only explains how to create user-friendly email newsletters but also helps you improve email deliverability, organically grow your mailing list, implement industry-standard best-practices and apply practical troubleshooting tips and tricks.

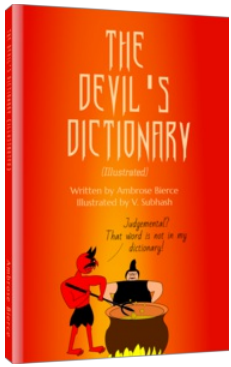
• Pages: 40 (33 with real content) • Paperback: $7.70 • Ebook: ₹100 or $3

How To Cure Common Cold

Non-allergic rhinitis or common cold is an ailment that usually resolves on its own. It can be very disruptive and make you feel miserable. ***How To Cure Common Cold*** **describes several palliative measures** (not curative options) that can be used to treat the symptoms while the body fights off the infection. Because this is a thin topic, **bonus content** on natural weight-loss techniques, an easy-to-cook vegetarian food recipe, dental care tips, skincare tips, and some family-planning advice are included in this book. **DISCLAIMER**: The author is not a medical professional. Despite seeking medical treatment for common cold, his deviated nasal septum made the episodes very difficult to go through. Over several years, he tried and tested several palliative measures to treat the symptoms. In this book, he describes what measures might work for young healthy individuals like him. These recommendations are not intended for kids, adolescents, convalescents, seniors or in people where the cold symptoms are part of a larger ailment.**This book is not sponsored by any drug firm or commercial entity.**

• Pages: 31 (8 with real content) • Paperback: $4.99 • Ebook: ₹99 or $1 or **FREE**

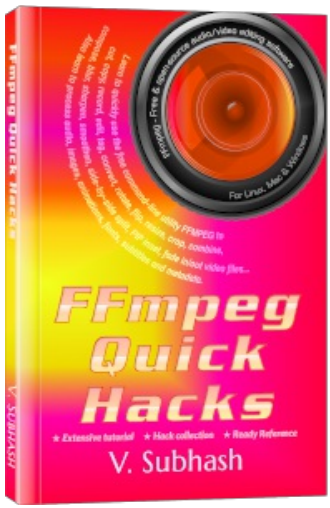
The Devil's Dictionary

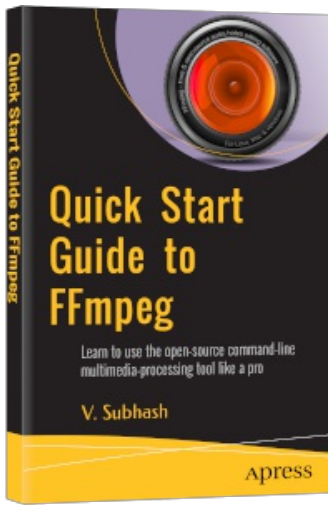


The Devil's Dictionary by Ambrose Bierce from 1911 is a great repository of brutally frank and unusually cynical descriptions for popular words and phrases in English. In my 2020 remake, the original text has been illustrated with contemporary caricatures (of Alexandria Ocasio Cortez, Bill Gates, Don Lemon, Elon Musk, Joe Biden...). It has the **neat easy-on-the-eye look of any new dictionary (modern fonts, two-column pages, starting/ending words on every page)**. If you consider yourself as a woke, liberal, Leftie, Progressive, Socialist, Communist, Feminist... then this book is not for you. This book by Bierce is a product of its time and may not match your unrealistic expectations. Maybe, you could gift it to your (fr)enemies. They might like it.

• Pages: 160 • Paperback: $9 • Ebook: ₹100 or $2

Quick Start Guide to FFmpeg

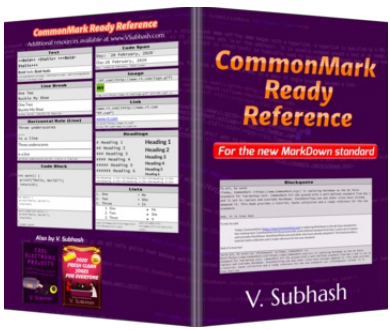




FFmpeg is THE BEST software to easily create, edit, enhance and convert audio and video files. It is a FREE and open-source command-utility available **for Linux, Mac and Windows**. And, ***Quick Start Guide to FFmpeg*** is THE BEST book for an extensive FFmpeg tutorial, hack collection and quick reference. It is richly illustrated with color screenshots, code examples and tables to help you work with audio, video, images, animations, fonts, subtitles and metadata like a PRO. NOTE: In 2023, the old self-published book *FFmpeg Quick Hacks* was withdrawn.

• Pages: 280 • Colour Paperback: $44.99 • PDF Ebook: $29.99 (from Apress/SpringerNature)

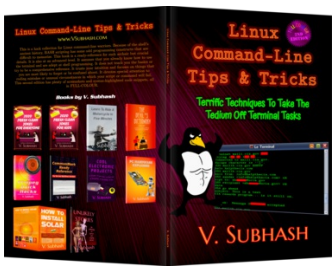
CommonMark Ready Reference



MarkDown is an easy human-readable text format that can serve as the common base for exporting to multiple document formats such as HTML, ODF, DOC/DOCX, PDF and ebook (EPUB, MOBI...). It is a great tool for authors, technical writers and content developers to create books, manuals, web pages and other rich-text content. CommonMark is a new well-formed standard for the old MarkDown spec. **CommonMark was one of the reasons I was able to write and design 21 books in one year.** Incidentally, this is the first-ever book on CommonMark. You will be buying a piece of history! The paperback's covers are designed like a quick reference card.

• Pages: 56 (39 with real content, 6 with bonus content) • Paperback: $7 • Ebook: **FREE** or ₹70 or $1

Linux Command-Line Tips & Tricks



This is a tips-and-tricks collection for Linux command-line warriors. It is also at an advanced level. It assumes that you already know how to use the terminal and are adept at shell programming. It does not teach you the basics or try to be a comprehensive reference. It trusts your intuition and focuses on things you are most likely to forget. Because of its ancient history, BASH scripting has some odd programming constructs that are difficult to memorize. This book tries to provide a ready-reference for such archaic but crucial details. It pays special attention to coding mistakes or unusual circumstances in which your script or command will fail. The paperback has screenshots and syntax-highlighted code examples, all in full-colour.

• Pages: 100 • Colour Paperback: $9.99 • Ebook: ₹100 or $3

PC Hardware Explained

You can build a PC in 30 minutes with just a screwdriver. Knowing which computer components will work together is not so easy. This full-colour paperback will explain computer hardware using **simple terms, illustrations, photographs and tables**. Before **buying a new laptop from the store** or **assembling a new desktop from parts**, get this book. You will be able to read the technical specifications of a PC and understand what it can and cannot do. The mumbo-jumbo accompanying the sales pitch of a new computer will not be so alien.

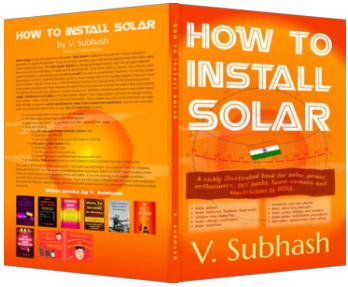
• Pages: 30 (22 with real content) • Colour paperback: $7 • Ebook: ₹100 or $3

Cool Electronic Projects

If you are learning electronics or thinking of it as a future hobby, this FULL-COLOUR book has some fun projects to begin with. They will not waste your time or money, will be extremely useful (particularly in emergencies) and are quite easy to make. Just one of these projects uses AC (alternating current). The rest work on DC (direct current) and are safe for kids (if you think soldering is safe). These projects are good for the environment too, as they reuse electronic parts that would have been discarded. If you are a survivalist, then you will be happy that all the projects will run off-the-grid, as they can consume renewable energy. For the tinkerer, there are projects that add MORE POWER than what the manufacturer had provided. For the parent of lazy children, there are annoying alarms that can wake up the dead.

• Pages: 40 (33 with real content) • Paperback: $9.90 • Ebook: ₹100 or $3

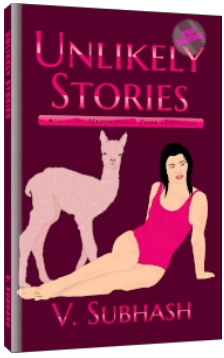
How To Install Solar



This is a heavily illustrated guidebook for **INDIAN** solar power enthusiasts, DIY hacks, home-owners and electricians about solar panels, batteries, inverters, charge controllers, installation procedures and costs. It starts with a simple introduction to home electrical systems, proceeds on to describe various aspects of solar power and options available for home owners, and then provides step-by-step instructions for installing a low-cost DC-only solar charge controller system for ₹6000 and a solar inverter system providing AC power backup for ₹30,000. Also included is an extensive FAQs section based on questions and reviews published by solar power users online.

• Pages: 76 • Colour paperback: $7.70 • Ebook: ₹100 or $3

Unlikely Stories



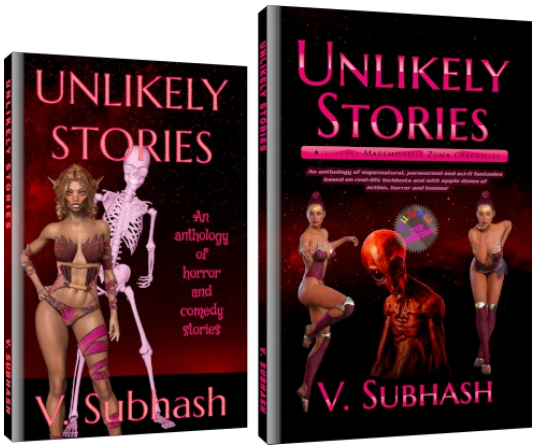
This is an anthology of horror and comedy stories — an exorcism, an alien encounter, a haunted lift, a seance, a shapeshifter, a werewolf, a talking bird, an evil twin, an alien invasion and a distressed young alpaca — all weaved into a witty love yarn. The author originally intended to write a non-fiction book based on real-life incidents. He was however **forced by several governments** to name this book as '*Unlikely Stories*' and release it only as a fiction title. The stories have turned out to be **supernatural, paranormal and sci-fi fantasies with ample doses of action, horror and humour**. The entire book is in first person and everything happens very fast. There is never a dull moment.

First edition stories

- **The trip**: The lead is invited by his friend to a resort where he meets the first heroine. He nicknames her *Vampira*.

- **The swim**: The lead decides that Vampira is the soul mate he has been waiting all his life. He tells several stories to entertain his friend's kids and also impress Vampira.
- **The exorcist**: The second lead is an Indian crook who escapes to the West to start a new life. He attempts to go legit but finds competition from a professional medium operating under the trade name of *Mademoiselle Zuma*. She is dangerous because she is a mind-reader.
- **Alien encounter**: After the successful exorcism, this lead is asked to help a teenager who has been repeatedly 'abducted' by an alien.
- **The lift**: A recently deceased security guard haunts a lift where he had died and seeks revenge.
- **Femme fatale**: The second lead has a showdown with a female animal spirit.
- **The seance**: A young woman in the city is troubled by nightmares involving a hooded skeleton. A newly married nurse blanks out every night. She is also troubled by bizarre nightmares. Mademoiselle Zuma solves both cases.
- **The haunting**: An old mansion is haunted by a presence. Every new buyer and his family gets driven to such desperation that they eventually sell. The second lead investigates and almost gets killed.
- **Family planning**: The first lead and Vampira plan their life together. In the first ending, they get married. In the second ending (written by the lead after their first night), **Stone Age Man (SAM)** and **Stone Age Woman (SAW)** discover the mystery of life. (This is an over-the-top parody of the **controversy about *MEN WRITING WOMEN*** .) Other than some intimate events implied in comic fashion in this story, there is no physical contact between the sexes in the entire book. Not even a kiss. The book is clean throughout. No swear words. No corny mushy dialogue. No degeneracy. No weirdness. Just no low-hanging fruit.

New stories in second edition (*Mademoiselle Zuma Chronicles*)



- **Shadows in the night**: A young woman is troubled by a ghostly intruder at night.
- **Zuma vs. Cutie**: Zuma finds competition from an unlikely friend.
- **The evil twin**: A rich heiress is driven to desperation by a deceased twin who wants her to die as well.
- **Alien chicks are nothing but trouble**: A meteorite crashes down in the Atlantic. The site becomes an alien platform for launching attacks on English-speaking countries. No other countries are attacked. The world's sole superpower collapses after a few days. That is not strangest thing about the invasion. The invaders' primary objective is not humans but cows. This is no run-of-the-mill alien-invasion story. Uniquely, it provides a fascinating economic model for a successful alien invasion.
- **Please do not smile at our alpaca**: Zuma and her husband restart a farm devastated by the aliens. Things go well until her husband picks a fight with a South American.

NOTE: The second edition has several stories written from the perspective of Zuma.

• Second-edition colour paperback (122 pages, 15 stories): $9.99 • Second-edition grayscale paperback: $9 • Second-edition ebook: ₹200 or $3

• First-edition grayscale paperback (144 pages, 10 stories): $7.77 • First-edition ebook: **FREE** or ₹100 or $1.99

About the author

You will never find another guy with so many talents as this one! V. Subhash is an invisible Indian writer, programmer, cartoonist and humourist. He grew up in Chennai but is now settled in his native Kerala. In 2020, he published one of the biggest jokebooks of all time — ***2020 Fresh Clean Jokes For Everyone*** . Subhash was inspired to write it after years of listening to vintage American radio shows such as *Fibber & Molly* and *Duffy's Tavern* . In the same year, he followed up with a how-to book on the multimedia software FFmpeg and a 400-page volume of 149 political cartoons. How did he do that? Subhash pursues numerous hobbies and interests that inevitably became the subject of his books — like ***Cool Electronic Projects***, ***How To Invest In Stocks*** and ***How To Install Solar*** . He used to have pet tortoises but they died in a parking accident. Everyone was crushed. For two decades before 2020, Subhash used his personal website **www.VSUBHASH.in** as the main outlet for his writing while also accumulating a lot of unpublished material. By 2022, he had exhausted all that he could publish. Meanwhile, his probe into 'aliens' had revealed that they are just ordinary employees/contractors of US military and space agencies. They begged him not to write anything so he published his findings in his debut fiction title named ***Unlikely Stories*** . The stories turned out to be supernatural/paranormal/sci-fi fantasies with ample doses of action, horror and humour. In 2023, Apress (SpringerNature) published his rewritten and updated FFmpeg book as ***Quick Start Guide To FFmpeg*** .

FOR PROFESSIONALS BY PROFESSIONALS®

Quick Start Guide to FFmpeg

Create, edit, enhance and convert multimedia files using FFmpeg, the most versatile open source audio and video processing tool available for Linux, Mac and Windows users. After reading this book, you will be able to work with video and audio files, images, text, animations, fonts, subtitles and metadata like a pro.

This book is based on the latest Long-Term Support (LTS) version of FFmpeg. It begins with a simple introduction to FFmpeg executables — ffmpeg, ffprobe and ffplay, and explains how you can use them to process multimedia containers, streams, audio channels, maps and metadata. It then describes how you can easily edit, enhance and convert audio, video, image and text files. There are dedicated chapters for filters, audio, subtitles and metadata, as well as a big collection of FFmpeg tips and tricks. Sample lists of FFmpeg filters, encoders, decoders, formats and codecs are also available as appendices.

Quick Start Guide to FFmpeg is for anyone who needs to edit or process multimedia files including studio professionals, broadcast personnel, video content creators (such as Youtubers), podcasters, librarians, archivists and webmasters. It will be indispensable for those wanting to process a variety of multimedia files from the command line and inside shell scripts or custom-built software.

You will learn to:

- Convert from one format to another video-to-video, video-to-audio, video-to-image, image-to-video, video-to-animation, animation-to-video, text-to-audio, text-to-video
- Edit video files by cutting them with and without re-encoding, appending (joining clips together), resizing, changing frame rate and aspect ratio, mixing in audio
- Use filters to rotate, flip, crop, overlay (side-by-side or inset), remove logos, blur, smooth and sharpen, apply transitions as well as speed up or down playback
- Edit audio files by changing, normalizing or compressing volume, mixing and splitting channels and detecting silence. Also, learn to generate waveforms as video or image
- Add subtitles, place them anywhere on the screen, use custom fonts and colors, and use different languages
- Set metadata such as MP3 tags for and album art, set global and stream-specific metadata. And, learn how to import, export and remove metadata
- Automate your FFmpeg tasks

Shelve in:
Open-source, Multimedia

User level:
Beginner to intermediate