

# Package: av (via r-universe)

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**Type** Package

**Title** Working with Audio and Video in R

**Version** 0.9.6

**Description** Bindings to 'FFmpeg' <<http://www.ffmpeg.org/>> AV library for working with audio and video in R. Generates high quality video from images or R graphics with custom audio. Also offers high performance tools for reading raw audio, creating 'spectrograms', and converting between countless audio / video formats. This package interfaces directly to the C API and does not require any command line utilities.

**License** MIT + file LICENSE

**URL** <https://ropensci.r-universe.dev/av>, <https://docs.ropensci.org/av/>

**BugReports** <https://github.com/ropensci/av/issues>

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Roxygen** list(markdown = TRUE)

**SystemRequirements** FFmpeg (>= 3.2); with at least libx264 and lame (mp3) drivers. MacOS Homebrew: ffmpeg. Debian/Ubuntu: libavfilter-dev. Fedora/RHEL: either ffmpeg-devel from <https://rpmfusion.org> (preferred), or libavfilter-free-devel which is a more limited version available on Fedora/EPEL9.

**Depends** R (>= 3.5)

**Imports** graphics

**Config/Needs/website** seewave, ggplot2, phonTools, signal, tuneR

**Suggests** curl, testthat, ps, ggplot2, gapminder

**Language** en-US

**Config/pak/sysreqs** libavfilter-dev

**Repository** <https://ropensci.r-universe.dev>

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**RemoteUrl** <https://github.com/ropensci/av>

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|                 |                                |
|-----------------|--------------------------------|
| av_video_images | <i>Convert video to images</i> |
|-----------------|--------------------------------|

---

**Description**

Splits a video file in a set of image files. Default image format is jpeg which has good speed and compression. Use format = "png" for losless images.

**Usage**

```
av_video_images(  
    video,  
    destdir = tempfile(),  
    format = "jpg",  
    fps = NULL,  
    trim = NULL  
)
```

**Arguments**

|         |                                                                                                                           |
|---------|---------------------------------------------------------------------------------------------------------------------------|
| video   | an input video                                                                                                            |
| destdir | directory where to save the png files                                                                                     |
| format  | image format such as png or jpeg, must be available from av_encoders()                                                    |
| fps     | sample rate of images. Use NULL to get all images.                                                                        |
| trim    | string value for <b>ffmpeg trim filter</b> for example "10:15" for seconds or "start_frame=100:end_frame=110" for frames. |

## Details

For large input videos you can set `fps` to sample only a limited number of images per second. This also works with fractions, for example `fps = 0.2` will output one image for every 5 sec of video.

## Examples

```
## Not run:
curl::curl_download('https://jeroen.github.io/images/blackbear.mp4', 'blackbear.mp4')
av_video_images('blackbear.mp4', fps = 1, trim = "10:20")

## End(Not run)
```

---

capturing

*Record Video from Graphics Device*


---

## Description

Runs the expression and captures all plots into a video. The [av\\_spectrogram\\_video](#) function is a wrapper that plots data from [read\\_audio\\_fft](#) with a moving bar and background audio.

## Usage

```
av_capture_graphics(
  expr,
  output = "output.mp4",
  width = 720,
  height = 480,
  framerate = 1,
  vfilter = "null",
  audio = NULL,
  verbose = TRUE,
  ...
)

av_spectrogram_video(
  audio,
  output = "output.mp4",
  framerate = 25,
  verbose = interactive(),
  ...
)
```

## Arguments

|                     |                                                                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------------------------|
| <code>expr</code>   | an R expression that generates the graphics to capture                                                             |
| <code>output</code> | name of the output file. File extension must correspond to a known container format such as mp4, mkv, mov, or flv. |

|           |                                                                                                                                                                   |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| width     | width in pixels of the graphics device                                                                                                                            |
| height    | height in pixels of the graphics device                                                                                                                           |
| framerate | video framerate in frames per seconds. This is the input fps, the output fps may be different if you specify a filter that modifies speed or interpolates frames. |
| vfilter   | a string defining an ffmpeg filter graph. This is the same parameter as the <code>-vf</code> argument in the <code>ffmpeg</code> command line utility.            |
| audio     | path to media file with audio stream                                                                                                                              |
| verbose   | emit some output and a progress meter counting processed images. Must be TRUE or FALSE or an integer with a valid <a href="#">av_log_level</a> .                  |
| ...       | extra graphics parameters passed to <a href="#">png()</a>                                                                                                         |

### See Also

Other av: [demo\(\)](#), [encoding](#), [formats](#), [info](#), [logging](#), [read\\_audio\\_fft\(\)](#)

### Examples

```
library(gapminder)
library(ggplot2)
makeplot <- function(){
  datalist <- split(gapminder, gapminder$year)
  lapply(datalist, function(data){
    p <- ggplot(data, aes(gdpPercap, lifeExp, size = pop, color = continent)) +
      scale_size("population", limits = range(gapminder$pop)) + geom_point() + ylim(20, 90) +
      scale_x_log10(limits = range(gapminder$gdpPercap)) + ggtitle(data$year) + theme_classic()
    print(p)
  })
}

# Play 1 plot per sec, and use an interpolation filter to convert into 10 fps
video_file <- file.path(tempdir(), 'output.mp4')
av_capture_graphics(makeplot(), video_file, 1280, 720, res = 144, vfilter = 'framerate=fps=10')
av::av_media_info(video_file)
# utils::browseURL(video_file)
```

---

demo

*Demo Video*

---

### Description

Generates random video for testing purposes.

**Usage**

```
av_demo(  
    output = "demo.mp4",  
    width = 960,  
    height = 720,  
    framerate = 5,  
    verbose = TRUE,  
    ...  
)
```

**Arguments**

|           |                                                                                                                                                                   |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| output    | name of the output file. File extension must correspond to a known container format such as mp4, mkv, mov, or flv.                                                |
| width     | width in pixels of the graphics device                                                                                                                            |
| height    | height in pixels of the graphics device                                                                                                                           |
| framerate | video framerate in frames per seconds. This is the input fps, the output fps may be different if you specify a filter that modifies speed or interpolates frames. |
| verbose   | emit some output and a progress meter counting processed images. Must be TRUE or FALSE or an integer with a valid <a href="#">av_log_level</a> .                  |
| ...       | other parameters passed to <a href="#">av_capture_graphics</a> .                                                                                                  |

**See Also**

Other av: [capturing](#), [encoding](#), [formats](#), [info](#), [logging](#), [read\\_audio\\_fft\(\)](#)

---

encoding

*Encode or Convert Audio / Video*

---

**Description**

Encodes a set of images into a video, using custom container format, codec, fps, [video filters](#), and audio track. If input contains video files, this effectively combines and converts them to the specified output format.

**Usage**

```
av_encode_video(  
    input,  
    output = "output.mp4",  
    framerate = 24,  
    vfilter = "null",  
    codec = NULL,  
    audio = NULL,  
    verbose = TRUE
```

```

)

av_video_convert(video, output = "output.mp4", verbose = TRUE)

av_audio_convert(
  audio,
  output = "output.mp3",
  format = NULL,
  channels = NULL,
  sample_rate = NULL,
  bit_rate = NULL,
  start_time = NULL,
  total_time = NULL,
  verbose = interactive()
)

```

### Arguments

|             |                                                                                                                                                                   |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| input       | a vector with image or video files. A video input file is treated as a series of images. All input files should have the same width and height.                   |
| output      | name of the output file. File extension must correspond to a known container format such as mp4, mkv, mov, or flv.                                                |
| framerate   | video framerate in frames per seconds. This is the input fps, the output fps may be different if you specify a filter that modifies speed or interpolates frames. |
| vfilter     | a string defining an ffmpeg filter graph. This is the same parameter as the <code>-vf</code> argument in the ffmpeg command line utility.                         |
| codec       | name of the video codec as listed in <a href="#">av_encoders</a> . The default is libx264 for most formats, which usually the best choice.                        |
| audio       | audio or video input file with sound for the output video                                                                                                         |
| verbose     | emit some output and a progress meter counting processed images. Must be TRUE or FALSE or an integer with a valid <a href="#">av_log_level</a> .                  |
| video       | input video file with optionally also an audio track                                                                                                              |
| format      | a valid output format name from the list of <code>av_muxers()</code> . Default NULL infers format from the file extension.                                        |
| channels    | number of output channels. Default NULL will match input.                                                                                                         |
| sample_rate | output sampling rate. Default NULL will match input.                                                                                                              |
| bit_rate    | output bitrate (quality). A common value is 192000. Default NULL will match input.                                                                                |
| start_time  | number greater than 0, seeks in the input file to position.                                                                                                       |
| total_time  | approximate number of seconds at which to limit the duration of the output file.                                                                                  |

### Details

The target container format and audio/video codes are automatically determined from the file extension of the output file, for example mp4, mkv, mov, or flv. For video output, most systems also

support gif output, but the compression~quality for gif is really bad. The [gifski](#) package is better suited for generating animated gif files. Still using a proper video format results in much better quality.

It is recommended to use let ffmpeg choose the suitable codec for a given container format. Most video formats default to the libx264 video codec which has excellent compression and works on all modern browsers, operating systems, and digital TVs.

To convert from/to raw PCM audio, use file extensions ".ub" or ".sb" for 8bit unsigned or signed respectively, or ".uw" or ".sw" for 16-bit, see extensions in [av\\_muxers\(\)](#). Alternatively can also convert to other raw audio PCM by setting for example format = "u16le" (i.e. unsigned 16-bit little-endian) or another option from the name column in [av\\_muxers\(\)](#).

It is safe to interrupt the encoding process by pressing CTRL+C, or via [setTimeLimit](#). When the encoding is interrupted, the output stream is properly finalized and all open files and resources are properly closed.

### See Also

Other av: [capturing](#), [demo\(\)](#), [formats](#), [info](#), [logging](#), [read\\_audio\\_fft\(\)](#)

---

|         |                   |
|---------|-------------------|
| formats | <i>AV Formats</i> |
|---------|-------------------|

---

### Description

List supported filters, codecs and container formats.

### Usage

[av\\_encoders\(\)](#)

[av\\_decoders\(\)](#)

[av\\_filters\(\)](#)

[av\\_muxers\(\)](#)

[av\\_demuxers\(\)](#)

### Details

Encoders and decoders convert between raw video/audio frames and compressed stream data for storage or transfer. However such a compressed data stream by itself does not constitute a valid video format yet. Muxers are needed to interleave one or more audio/video/subtitle streams, along with timestamps, metadata, etc, into a proper file format, such as mp4 or mkv.

Conversely, demuxers are needed to read a file format into the separate data streams for subsequent decoding into raw audio/video frames. Most operating systems natively support demuxing and decoding common formats and codecs, needed to play those videos. However for encoding and muxing such videos, ffmpeg must have been configured with specific external libraries for a given codec or format.

See Also

Other av: [capturing](#), [demo\(\)](#), [encoding](#), [info](#), [logging](#), [read\\_audio\\_fft\(\)](#)

---

|      |                   |
|------|-------------------|
| info | <i>Video Info</i> |
|------|-------------------|

---

Description

Get video info such as width, height, format, duration and framerate. This may also be used for audio input files.

Usage

```
av_media_info(file)
```

Arguments

|      |                          |
|------|--------------------------|
| file | path to an existing file |
|------|--------------------------|

See Also

Other av: [capturing](#), [demo\(\)](#), [encoding](#), [formats](#), [logging](#), [read\\_audio\\_fft\(\)](#)

---

|         |                |
|---------|----------------|
| logging | <i>Logging</i> |
|---------|----------------|

---

Description

Get or set the **log level**.

Usage

```
av_log_level(set = NULL)
```

Arguments

|     |                            |
|-----|----------------------------|
| set | new <b>log level</b> value |
|-----|----------------------------|

See Also

Other av: [capturing](#), [demo\(\)](#), [encoding](#), [formats](#), [info](#), [read\\_audio\\_fft\(\)](#)

---

|                |                                             |
|----------------|---------------------------------------------|
| read_audio_fft | <i>Read audio binary and frequency data</i> |
|----------------|---------------------------------------------|

---

## Description

Reads raw audio data from any common audio or video format. Use [read\\_audio\\_bin](#) to get raw PCM audio samples, or [read\\_audio\\_fft](#) to stream-convert directly into frequency domain (spectrum) data using FFmpeg built-in FFT.

## Usage

```
read_audio_fft(  
  audio,  
  window = hanning(1024),  
  overlap = 0.75,  
  sample_rate = NULL,  
  start_time = NULL,  
  end_time = NULL  
)
```

```
read_audio_bin(  
  audio,  
  channels = NULL,  
  sample_rate = NULL,  
  start_time = NULL,  
  end_time = NULL  
)
```

```
write_audio_bin(  
  pcm_data,  
  pcm_channels = 1L,  
  pcm_format = "s32le",  
  output = "output.mp3",  
  ...  
)
```

## Arguments

|             |                                                                                                                                                                                    |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| audio       | path to the input sound or video file containing the audio stream                                                                                                                  |
| window      | vector with weights defining the moving <a href="#">fft window function</a> . The length of this vector is the size of the window and hence determines the output frequency range. |
| overlap     | value between 0 and 1 of overlap proportion between moving fft windows                                                                                                             |
| sample_rate | downsample audio to reduce FFT output size. Default keeps sample rate from the input file.                                                                                         |

|                                   |                                                                                                       |
|-----------------------------------|-------------------------------------------------------------------------------------------------------|
| <code>start_time, end_time</code> | position (in seconds) to cut input stream to be processed.                                            |
| <code>channels</code>             | number of output channels, set to 1 to convert to mono sound                                          |
| <code>pcm_data</code>             | integer vector as returned by <a href="#">read_audio_bin</a>                                          |
| <code>pcm_channels</code>         | number of channels in the data. Use the same value as you entered in <a href="#">read_audio_bin</a> . |
| <code>pcm_format</code>           | this is always s32le (signed 32-bit integer) for now                                                  |
| <code>output</code>               | passed to <a href="#">av_audio_convert</a>                                                            |
| <code>...</code>                  | other paramters for <a href="#">av_audio_convert</a>                                                  |

### Details

Currently [read\\_audio\\_fft](#) automatically converts input audio to mono channel such that we get a single matrix. Use the `plot()` method on data returned by [read\\_audio\\_fft](#) to show the spectrogram. The [av\\_spectrogram\\_video](#) generates a video that plays the audio while showing an animated spectrogram with moving status bar, which is very cool.

### See Also

Other av: [capturing](#), [demo\(\)](#), [encoding](#), [formats](#), [info](#), [logging](#)

### Examples

```
# Use a 5 sec fragment
wonderland <- system.file('samples/Synapsis-Wonderland.mp3', package='av')

# Read initial 5 sec as as frequency spectrum
fft_data <- read_audio_fft(wonderland, end_time = 5.0)
dim(fft_data)

# Plot the spectrogram
plot(fft_data)

# Show other parameters
dim(read_audio_fft(wonderland, end_time = 5.0, hamming(2048)))
dim(read_audio_fft(wonderland, end_time = 5.0, hamming(4096)))
```

---

window functions

*Window functions*

---

### Description

Several common **windows function** generators. The functions return a vector of weights to use in [read\\_audio\\_fft](#).

**Usage**

hanning(n)  
hamming(n)  
blackman(n)  
bartlett(n)  
welch(n)  
flattop(n)  
bharris(n)  
bnutall(n)  
sine(n)  
nutall(n)  
bhann(n)  
lanczos(n)  
gauss(n)  
tukey(n)  
dolph(n)  
cauchy(n)  
parzen(n)  
bohman(n)

**Arguments**

n                      size of the window (number of weights to generate)

**Examples**

```
# Window functions
plot(hanning(1024), type = 'l', xlab = 'window', ylab = 'weight')
lines(hamming(1024), type = 'l', col = 'red')
lines(bartlett(1024), type = 'l', col = 'blue')
lines(welch(1024), type = 'l', col = 'purple')
lines(flattop(1024), type = 'l', col = 'darkgreen')
```

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