Input Video and Recording Environment Recommendations

FacePulseRate: A Suite of Features to Facilitate the Use of iPhys Toolbox

Douglas Magill

October 2020

Input Video Requirements and Recommendations

Video Format

Color videos. Grayscale videos are not suitable for the pulse-rate algorithms used by FacePulseRate.

Supported file extensions include …

- .mp4
- .avi

Other file extensions may be supported. Use Matlab function VideoReader.getFileFormats() to return a list of supported file extensions.

Note that videos with these file extensions may not be supported depending on the specific format (encoding) of the video.

Whether a format is supported depends upon two factors. The first factor is the Matlab release as FacePulseRate uses Matlab video readers. Format support from the Matlab video readers may change between releases. The second factor is the availability of codecs installed on a particular computer. FacePulseRate will verify whether a video is supported when the function is run. FacePulseRate uses the Matlab video readers to check the support of the video readers and to check whether the appropriate codecs are available on a particular computer.

Maximum Video Frame Size

The input videos can be up to 5000 pixels in either height or width.

Minimum Recommended Video Length

Consider using input videos of at least 3 minutes. The skin-detection algorithm and tailored skin-segmentation algorithm use skin-color samples from the face in the video to enhance their classifications. These algorithms require a minimum number of samples to be collected in order to be activated. For videos where face detections are not readily made, a longer length will be needed. These algorithms do not need to be enabled for proper operation, but their use may improve accuracy. A warning message will indicate when these algorithms were not activated due to an insufficient number of skin-color samples.

Maximum Video Length

There is no established maximum length, but the RAM demands for videos over 1.5 hours may cause some systems to become unstable.

Beyond the RAM used by Matlab, this function may use around 1 gibabyte of RAM for a 20-minute input video. The RAM use will gradually increase for longer videos. RAM use facilitates efficiency by reducing frame re-reading and duplicate processing. For longer videos, RAM used should be monitored to determine whether it is within desired levels. If operation becomes noticeably slower, this could indicate RAM use has exceeded RAM capacity and is being allocated to the hard drive. If RAM use is undesirable, consider breaking the video down to smaller segments. The function has been tested on a system with 8 gigabytes of RAM.

For Best Appearance of Output Video

The legend that is displayed on the output video has only been implemented for input videos with dimensions 1280 x 720 or 1920 x 1080 where the video is in a landscape orientation. For other cases, the legend will not be displayed.

For Faster Operation

Faster read performance will occur when argument StartTime is less than 10% the length of the full video.

Recording Environment

Although the environment cannot always be changed, skin detection and skin segmentation will be more successful in some recording environments than others.

Best recording environments:

- The face is not more than a few feet from the video camera.

- The colors of the background are distinct from the colors of the face. Skin tends to have a red hue -- this is the case across individuals with different skin colors -- so care might be taken to avoid backgrounds with colors similar to skin that also have a red hue.

- The brightness of the face is not too dark. Skin segmentation will sometimes segment out pixels that are close to black, so ensuring proper brightness in the area of the face can avoid this. Note that, assuming brightness of the face is adequate, the skin-segmentation algorithm is robust across individuals with different skin colors as no skin color would be expected to approach pure black. Cases of inadequate brightness are often the result of video cameras automatically reducing their brightness or exposure when a bright light source is present in an area of the frame other than the face. For example, lamps, windows, and solid white objects, including clothing, can sometimes lead to a video automatically reducing the brightness of the face.