FindFrame (V1.6.0)

**Purpose**

FindFrame will extract from a video file, into JPG image files, a sequence of frames at specific times. The time for each frame is specified by a combination of several offsets each relative to a single reference time. This program offers several different options for the designation of the input videos, destination of outputs and specification of the reference time. The parameters can all be supplied as command line arguments or may be entered via a GUI.

The program accepts two video files, one being the reference video, recording an example or demonstration movement, and the other being the focal video, a recording the participant emulating the movement.

At certain times, offset from a reference time, frames will be extracted from the focal video ready for inclusion within an assessment portfolio presenting the focal posture alongside that of the reference posture. Typically, the time offsets that specify the frames to be extracted will aim for a particular pose as well as a short period before and after.

The reference time, nominally the start of a movement sequence, can be input as a direct value, or the software will search the reference video for frames that match a trigger image.

**Use**

FindFrame can be run as a GUI program, whereupon the user can provide values and filenames by typing into a form and/or browsing for files.

FindFrame can also be run as a command line program where all of its input ill be supplied as additional values, as command line arguments.

**Command line**

The command line can take 3, 4, 5 or 6 arguments, each resulting in different behaviour

3 arguments

Findframe.exe TimesList focal\_video.mp4 DecimalRefTime

Extract only. Extract the frames from the video using the specified reference time

4 arguments

Findframe.exe Reference\_video TriggerImage TimesList focal\_video.mp4

Search and extract. Search the reference video for an insert that matches the triggerImage, then use the end of the insert as the reference time for frame extraction.

5 arguments

Findframe.exe Reference\_video TriggerImage TimesList focal\_video.mp4 SearchTime

Search and extract. Search the reference video for an insert that matches the triggerImage, then use the end of the insert as the reference time for frame extraction. The search begins at the specified time, and thus speeds the processing.

Switch based command line

An alternative command line style can also be processed by FindFrame, in which case the arguments can be supplied in any order, but each must be prefixed by an identifier. If the switch-based style is to be used then every argument must be appropriately identified, ie must be prefixed by ‘-‘ followed by an identifier character, followed immediately by the argument.

The identifiers used by FIndFrame are:-

-rReference\_video

-iTriggerImage

-fFocal\_video

-lTimeList

-tReferenceTime

-sSearchTime

-dDestDirectory

-aN – No to autorun…this will populate the GUI with the CL supplied values but will then await clicking of dialog buttons before processing the files. Really this is only of use for debugging.

Reference\_video is a pathname specifying the video file recording of the reference performer. If automated detection of the reference time by seeking a trigger insert, then this is the video that will be searched.

TriggerImage is a pathname specifying the image (.png or .jpg) that should be matched against an insert within the Reference\_video. The trigger image should be a white form on a black background. The top and bottom of the image should be black for at least the top and bottom 20%. The size and aspect ratio of the trigger image does not need to match that of the reference video.

Focal\_video is a pathname specifying the video file recording the movement of the focal participant. It is from this file that the frames will be extracted.

Timeslist is a pathname specifying a text file containing the time offsets. This file should be prepared using a text editor and should comprise one time per line. Each time is a decimal number of milliseconds. The list of times must be provided in sets of 5 where the quantity of such groups should match the number expected by any subsequent presentation software eg. 12, thus timelist.txt should contain 60 lines.

An example set of 5 times might be:-

12310

12410

12660

12910

13110

These values were chosen, for example, to extract frames from the focal video at target time of 12.66 seconds after the reference time, as well as frames 250 and 350 ms before and after the ideal time.

ReferenceTime is a decimal value (either integer or floating point) that specifies in seconds the point within the focal-video file to be used as the reference for frame extraction. The values contained in TimeList will be added to the reference time to select frames for extraction.

SearchTime is a decimal value, in seconds, specifying where in the reference video to begin the search for the trigger image. If SearchTime is positive then it specifies an offset from the start of the file, whereas a negative value specifies an offset from the end.

Under some circumstances the focal\_video file may have captured the participant in only a portion of the full frame, such as may be recorded from a zoom call when the performer and the participant appeared on screen side by side. In this case the exported images should present only the focal participant. An additional specifier file, subimagecoords.txt, can be placed in the same folder as the TimesList file. Subimagecoords.txt must contain 4 entries, one per line, providing the X and Y coordinates for the top-left corner followed by the X and Y coordinates for the bottom-right corner, where 0,0 is the top-left corner of the image. Eg.

640

180

1280

540

DestDirectory is a pathname to a folder where the output files will be placed. By default this detination is the same folder as where the focal-video file was stored.

Eg.

findFrame.exe -dD:\pdftesting\frames -lD:\NotBackedup\EliVideo\image\_times.txt -fD:\NotBackedup\EliVideo\GMT20210331-114231\_Recording\_gvo\_1280x720.mp4 -t5309.36

**Output files**

The result of a successful search and export will be a quantity of images (jpg) placed into the destination folder. The filenames will be extended versions of the focal-video filename, appending a trigger number (1), a group number, an image number. The group number is the group of 5 timed offsets that was used to extract he frame while the image number is the offset (1-5) within that group. Hence a TimeList file containing 15 offset values will produce 15 images named \*\_1\_1…\*1\_5, \*\_2\_1…\*\_2\_5 and \*\_3\_1…\*\_3\_5.

For example, a focal\_file called “GMT20210331-114231\_Recording\_gvo\_1280x720.mp4” would result in output image files:-

GMT20210331-114231\_Recording\_gvo\_1280x720.mp4\_1\_1\_1.jpg

GMT20210331-114231\_Recording\_gvo\_1280x720.mp4\_1\_1\_2.jpg

…

GMT20210331-114231\_Recording\_gvo\_1280x720.mp4\_1\_1\_5.jpg

GMT20210331-114231\_Recording\_gvo\_1280x720.mp4\_1\_2\_1.jpg

…

GMT20210331-114231\_Recording\_gvo\_1280x720.mp4\_1\_2\_5.jpg

Etc.

**Support files**

The program file FIndFrame.exe is a compiled C++ program and needs some support libraries. These can be placed together with other support libraries, or can simply be stored in the same folder as the executable. The support libraries are:-

opencv\_ffmpeg330\_64.dll and

opencv\_world330.dll

Batch processing

There are a few batch files provided which assist with production of a PDF from a focal video.

Some system preparation must be done, but once these folders have been established, they will serve repeated use.

To keep the layout as tidy as possible, we shall assume that there is a folder where the tools (batch files, template files, executable code libraries etc) which will be assumed to be in the folder D:\danceTools

The videos are assumed to be placed in a separate location, perhaps on a separate drive, so assume these are in E:\recordings and that within this folder there are modelVideo.mp4 and focal\_a.mp4, focal\_b.mp4 etc.

The times for pose extraction may be unique for each recording, so we shall assume there will be a performance specific file times.txt which is also located in E:\recordings

A working folder should be created, say Z:\performancePDFs, within which we shall assume modelposes, frames and pdfs. Therefore there will exist:-

Z:\performancePDFs\modelposes

Z:\performancePDFs\frames

Z:\performancePDFs\pdfs

Preparation of model poses:-

This need be done once for each pose sequence performed by the model, and the purpose is to extract the frames to be formed into the PDF prepared for each focal video. As both the model poses and the focal poses should be synchronised, the same times.txt file can/should be used for both.

The first step would be to identify the time at which the sequence starts within the model video, say the offset from the start of the model video is 1234.56 seconds

Start by navigating to the tools folder using the commands>

D:

CD D:\danceTools

The model pose images will be extracted using the command extractAndPrepareModelPoses.cmd with the arguments

temporaryFramesDestinationFolder

modelPoseDestinationFolder

timesList

modelVideo

startTime

eg.

.\extractAndPrepareModelPoses.cmd D:\performancePDFs\frames D:\performancePDFs\modelposes E:\recordings\image\_times.txt E:\recordings\modelVideo.mp4 1234.56

This will create a series of PositionXX\_N.png images in the folder D:\ performancePDFs \modelposes

Preparation of each focal PDF file

The first step would be to identify the time at which the sequence starts within the focal video, say the offset from the start of the model video is 2345.67 seconds

Again, navigate to the tools folder using the commands>

D:

CD D:\danceTools

The focal pose images will be extracted and then used to build the PDF using the command extractAndPrepareModelPoses.cmd with the arguments

temporaryFramesDestinationFolder

modelPoseDestinationFolder

timesList

modelVideo

startTime

PDFdestinationFolder

eg.

.\extractAndPrepareFocalPoses.cmd D:\performancePDFs \frames D:\performancePDFs\modelposes E:\recordings\image\_times.txt E:\recordings\focalVideo.mp4 2345.67 D:\performancePDFs\pdfs