VidFormatGuardian Prototype Documentation

This program automatically checks and converts video files in a specified format to ensure they meet certain criteria. It verifies each file's format (video and audio format, audio channels, frame rate, etc.) making a report showing the validation of the file, if this file is invalid, the file is recoded and transformed into the valid format.

Installation of ffmpeg and ffprobe

FFmpeg is the leading multimedia framework, capable of decoding, encoding, transcoding, muxing, demuxing, streaming, filtering, and playing almost anything. FFprobe is a simple multimedia stream analyzer and is a complementary tool for FFmpeg.

The installation on Windows is straightforward:

1. Download the software.
2. Extract the folder.
3. Navigate to the bin folder, which contains the FFmpeg and FFprobe executables.
4. Create a folder on your hard drive, preferably in the Program Files folder, and name it as you wish.
5. Copy the executables into this folder.
6. Copy the path of the folder.
7. Add this folder to your computer's PATH environment variable.
8. Verify the installation by typing ***'ffmpeg'*** in the command prompt.

For more information, see this video: https://www.youtube.com/watch?v=IECI72XEox0

Helper Functions

In the application, we have some functions that assist with the calculation of certain formats not natively interpreted by the FFmpeg program.

- **Aspect Ratio:**
  Calculates the video aspect ratio from video_width and video_height.

- **Kilobits and Megabits per Second:**
  Converts a bit rate from bits per second to kilobits per second and megabits per second.

- **Getting Metadata from Files:**
  Retrieves video metadata using FFprobe.

Processing files and verify them

This function, ***`validate_file`***, extracts metadata from the files and then verifies that the formats of the files are correct. The correct format for all files is as follows:

- **MP4** video format:
A container that holds video, audio, and metadata.
- **H.264** video codec:
Compresses or decompresses video files.
- **AAC** audio codec:
Compresses and decompresses audio files.
- **25 FPS** frame rate:
Determines how smoothly a video plays.
- **16:9** aspect ratio:
The ratio of width to height of the video frame.
- **640 x 360** resolution:
The number of pixels in each dimension that can be displayed.
- **2 – 5 Mb/s** video bit rate:
The amount of video data transmitted per second.
- **Up to 256 kb/s** audio bit rate:
The amount of audio data transmitted per second.
- **Stereo** audio channels:
Refers to the number of audio channels in a recording.

In a loop of all the videos, we run the ***`validate_file`*** function and place any file that has at least one incorrect format into the ***`wrong_format_files`*** list. Inside the notebook, the console prints a report where all the invalid and valid files are visible, identifying the wrong format for each file individually in the loop.

Example:

```
file: Exercise3_Films\Cosmos_War_of_the_Planets.mp4
Wrong frame rate: 30000/1001
Wrong aspect ratio: 314:177
Wrong video_resolution: 628x354
Wrong audio bitrate: 317.103 kb/s
File is INVALID.
```

Once this is complete, another loop converts all the videos into the correct format and saves them in a folder called ***`valid_format_files`.*** At the end, it analyzes all the re-encoded files and verifies if there are any errors.