Robo-Vision-Stitch

This is a small C++ application that can stitch two videos of any size and length (limited by onboard RAM) to create an interwoven effect. A sample output can be seen in stitch.avi.

This application can be wrapped in a ROS node by using the stitch function in a callback and adding the necessary publishers/subscribers.

This application can be used by declaring input and output file paths as strings as inputs to the stitch function.

Requirements:

- OpenCv 2.4
- CMake 2.8 or greater
- C++ 11

Test Plan

- Low video resolution or video only comprises of 1 pixel
- One/two videos are not present
- One video is very short and the other is very long
- Input videos are already inverted (should become inverted to true video)

Test Cases

All outputs can be found in the test-outputs folder.

1. Original Files (dynamic_test.mp4 and field_trees.avi) - Video files with different sizes, times, and FPS - **test1.avi**
2. Empty file (empty.avi) and regular file (regular.mp4) - Empty file present - **no file generated**
3. JPG file (pic.jpg) and regular file (regular.mp4) - Only one frame present in one of the files - **test3.avi**
4. Files that do not exist (null.avi and null2.avi) - Unable to open file - **return -1**
5. Large files of the same size and time (large.mp4 and regular.mp4) - **test5.avi**.

Considerations

- Adjustment for different frame sizes
- Choice of frame rate (30 fps) to allow for smooth interweaving
- Memory - Use of up to only 2 Mat variables at a time
- Threading - Write function is concurrent with ond read function at a time
- Alternatives (Both are limited by the time the write function takes)
    - Use two queues as ring buffers, but due to the way Mat memory is managed, this is more difficult to implement, and allows for the same level of threading (write function is concurrent with one read function at a time)
    - Read files concurrently and store all frames in a queue. Execute write function once the read functions are finished.

Useful Sources:
http://www.drdobbs.com/parallel/optimizing-video-encoding-using-threads/225600370
https://stackoverflow.com/questions/17091975/opencv-videowriter-framerate-issue
https://docs.opencv.org/2.4/doc/tutorials/introduction/linux_gcc_cmake/linux_gcc_cmake.html