

Assignment #1
CS510 2014
“Perspective Warping”
Due Friday, Jan 31st

Introduction

The purpose of this assignment is to get everyone familiar with using the OpenCV library, and to reinforce intuitions about image transformations. To this extent, it is a “warm up exercise”. It is easier than you should expect the next three assignments to be, and although familiarity with OpenCV and image transforms will be necessary for future assignments, you will probably not re-use the code written for this assignment. Nonetheless, the more time and effort you put into this assignment, the more familiar you will become with OpenCV and the easier the upcoming assignments will be.

Task

You will write a program that takes three arguments: the name of a video file, the name of a text file, and a filename to write the output video to. The input video file will be in a format readable by OpenCV. (OpenCV uses the ffmpeg library to read many formats and codecs, but unfortunately not all of them). The output video filename will not have an extension. You should add the appropriate file extension for whatever format you use to write out the video. The text file will have four lines, with each line containing four numbers. Each line of the text file represents one point correspondence between the input frames and the output frames. For example, if the first line is contains

0 0 1 20

The pixel (0, 0) in every input frame becomes pixel (1, 20) in the corresponding output frame. The text file will contain four such lines, and four point correspondences define a perspective transform. Therefore the output video will be a perspective transformation of the input video.

Submission

Your program may be written in either C++ or Python. You will make a linux tar file that contains (1) all your source code, (2) one example of an input video and a text file and the corresponding output video, and (3) a README file that contains exact instructions as to how I should compile and execute your program. If your Python environment depends on environment variables (and most do), those must be included in the README file. You will email the tar file to draper@cs.colostate.edu by no later than midnight on Friday, Jan. 31st.

Restrictions

This is an individual programming assignment. All work must be your own. You may not borrow code from other students, the internet, or any other source.

Hints

- The `VideoCapture` class reads videos, and the `VideoWriter` class writes them. Be careful about the output parameters of `VideoWriter`.
- To get an image frame from a video stream, you will first need to **grab** it (which may fail, for example if you are at the end of the file) and then **retrieve** it.
- The `getPerspectiveTransform` function computes a perspective transformation matrix from four point correspondences.
- The `warpPerspective` function applies a perspective transformation to an image.
- This assignment is highly directed: I am telling you exactly what to do and how to do it. Do not expect this on future assignments. In the future, I will give you a goal and it is up to you to figure out how best to accomplish it.