CMSC 733, Computer Processing of Pictorial Information
Homework 2: Estimating height from a single image
Due on: 11:59:59PM on Friday, March 17 2017

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The aim of this homework is to estimate the height of the door at A. V. Williams building. The method used to do this is formally called as Single View Metrology in literature.

1 Data

Ask a friend to take a picture of you in-front of the A. V. Williams building. Make sure that the top and bottom of you and the door are visible. Also, include bricks in the bottom so that you can estimate the vanishing points easily. A sample photograph of me taken by Chahat is shown in Fig. 1.

Figure 1: A photo of me infront of the A. V. Williams building taken by Chahat.

2 Estimate Height of A. V. Williams door

1. Compute two vanishing points by intersecting parallel lines on the ground plane or on the building facade. Verify the parallel lines on the ground or facade converge to the same vanishing point in the image.
2. Compute and draw the horizon (a vanishing line) in the image.
3. Compute the vanishing point in the `Z` axis using vertical lines on the facade.
4. Compute the height of the front door of A. V. Williams building in `mm`.
5. Also measure the height of the camerain `mm`.

Hints: Look at Single View Meterology, Vanishing points and lines.

3 Starter Code

There is no starter code given for this project.

4 Submission Guidelines

Typeset all the calculations in LaTeXusing the IEEETran format given to you in `Draft` folder. The output file should be (**pdf and pdf ONLY**). Describe what you did in detail. Include images with vanishing points, lines and other points you measured. Feel free to use MATLAB to do the computations and to mesure things on the image. Submit your codes (whatever you write, `.m` files) with the naming convention
`YourDirectoryID_hw2.zip` onto ELMS/Canvas (**Please compress it to .zip and no other format**). Your `DirectoryID` is the username to your UMD e-mail ID. If your email ID is `ABCD@terpmail.umd.edu` or `ABCD@umd.edu`, your `DirectoryID` is `ABCD`. Your zip file should have the following things:

- Folder named `Code` with all your code.
- The image you used in `Data` folder.
- Typeset a report in LaTeXusing the IEEETran format given to you in `Draft` folder. The output file should be (**pdf and pdf ONLY**).
- A `Readme.txt` file on how to run your code if it is not as simple as running `demo.m`.

If your code does not comply with the above guidelines, you'll be given **ZERO** credit.

5 Allowed Matlab functions

All general MATLAB functions but you need to show computations done by hand in your draft.

6 Collaboration Policy

You are restricted to discuss the ideas with at most two other people. But the code you turn-in should be your own and if you **DO USE** (try not it and it is not permitted) other external codes/codes from other students - do cite them. For other honor code refer to the CMSC733 Spring 2017 website here https://www.cs.umd.edu/class/spring2017/cmsc733/.

Acknowledgements

This fun homework was inspired from 'Machine Perception' (CIS 580) course of University of Pennsylvania (https://fling.seas.upenn.edu/~cis580/wiki/index.php?title=Homeworks_Spring_2016).

Thanks to Siddharth Mysore from University of Pennsylvania for help with some codes.

DON'T FORGET TO HAVE FUN AND PLAY AROUND WITH IMAGES!.