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CS 445 - Project 5: Image Based Lighting

Complete the claimed points and sections below.

Total Points Claimed   [   ] / 250

    Core
    1. Stitch two key frames   [20] / 20
    2. Panorama using five key frames   [15] / 15
    3. Map the video to the reference plane [15] / 15
    4. Create background panorama   [15] / 15
    5. Create background movie   [10] / 10
    6. Create foreground movie   [15] / 15
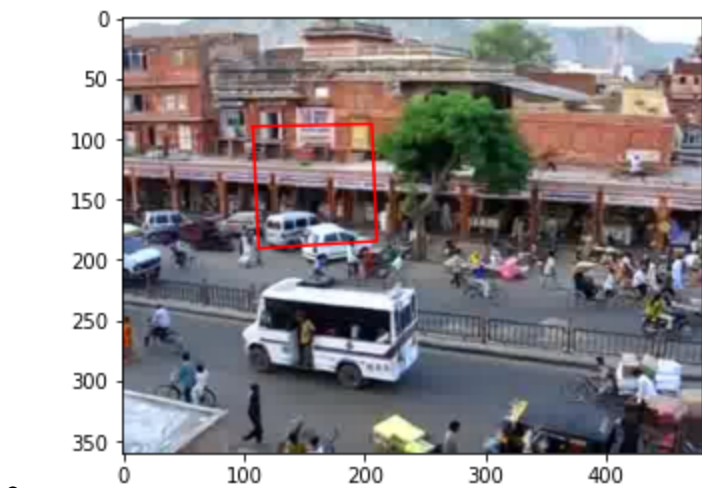   7. Quality of results and report   [10] / 10

    B&W
    8. Insert unexpected object   [   ] / 15
    9. Process your own video   [   ] / 20
    10. Smooth blending   [   ] / 30
    11. Improved fg/bg videos   [   ] / 40
    12. Generate a wide video   [   ] / 10
    13. Remove camera shake   [   ] / 20
    14. Make streets more crowded   [   ] / 15

1. Stitch two key frames

Include
- Display of image frames 270 and 450 with the red plot lines showing corresponding regions

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-
- Printout of 3x3 homography matrix normalized so that the largest value is 1

```
best score: 156.000000
[[ 1.00000000e+00  5.29654357e-02 -2.05137393e+02]
 [ 1.33237574e-02  9.56042308e-01 -1.63008326e+01]
 [ 3.86867704e-04  4.38704151e-05  8.11410423e-01]]
[<matplotlib.lines.Line2D at 0x7fd7e3eb9f50>]
:[6]:
```
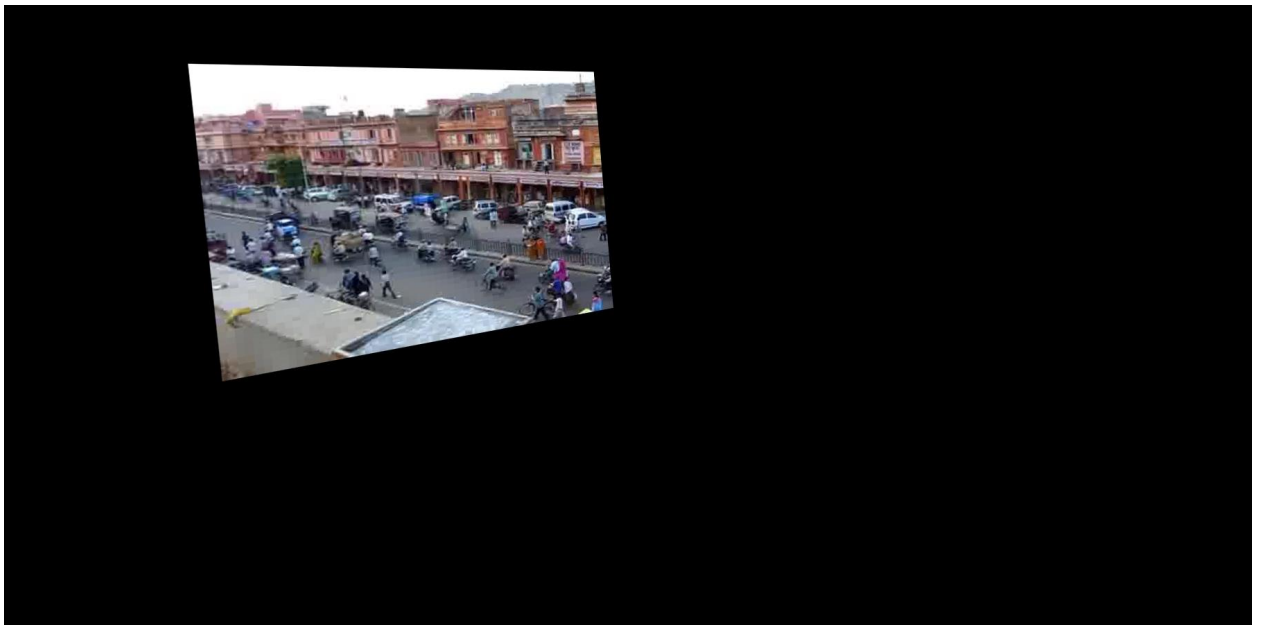-

2. Panorama using five key frames

Include your panoramic image

3. Map the video to the reference plane

Include:
- Link to your video
- https://mediaspace.illinois.edu/media/t/1_r6tfxy33
- Display frame 200 of your video

- Briefly explain how you solved for the transformation between each frame and the reference frame
  - For each frame, find its homography to a specified (also closest) key frame; then dot product with the homography from key frame to the target frame (which is previously computed) to get a new homography matrix. Use this to solve the transformation.

4. Create the background panorama

Include:
- Picture of the background panorama
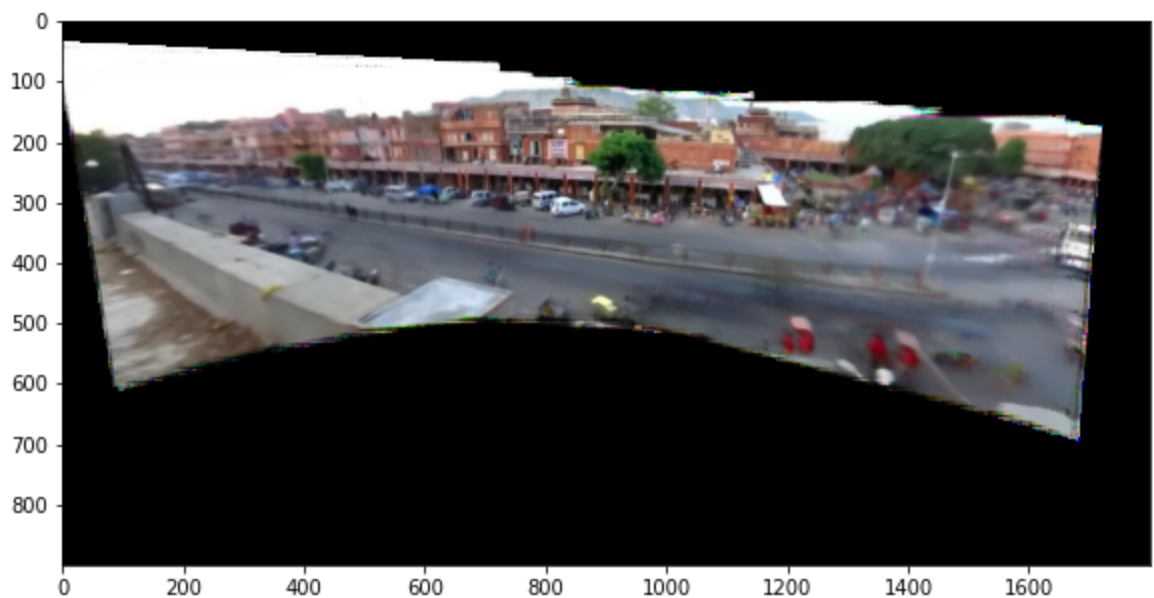
- Explain your method of computing the background color of a pixel
  - First, filter out all black pixels; then compute the median value of each pixel at each channel to exclude moving objects because moving objects cannot occupy 50% or more of pixels in the same location. Therefore this is a picture of median values.

5. Create the background movie

Include:

- Link to your video
- https://mediaspace.illinois.edu/media/t/1_3jmv8yby
- Display frame 200 of your video

-

6. Create the foreground movie

Include:
- Link to your video
- https://mediaspace.illinois.edu/media/t/1_0x6ux8uu
- Display frame 200 of your video

-

7. Quality of results / report

Nothing extra to include (scoring: 0=poor 5=average 10=great).

8. Insert unexpected object

Include link to your video.

9. Process your own video

Include:
- Background image
- Link to background video
- Link to foreground video

10. Smooth blending

Include panoramic image from part 2 with better blending

11. Smooth blending

Include panoramic image from part 2 with better blending

12. Generate a wide video

Include link to your video

13. Remove camera shake

Include link to your stabilized video

14. Make street more crowded

Include link to your video

Acknowledgments / Attribution

List any sources for code or images from outside sources