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CS445

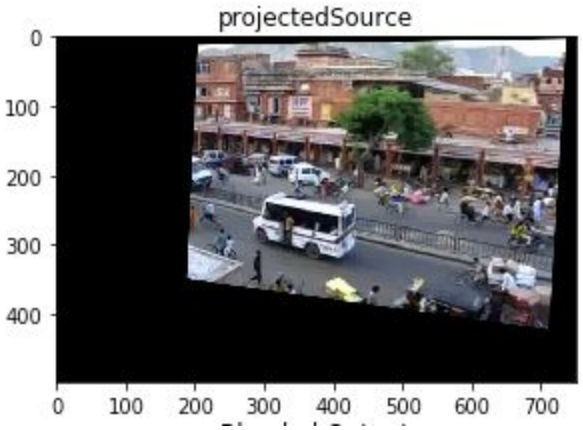
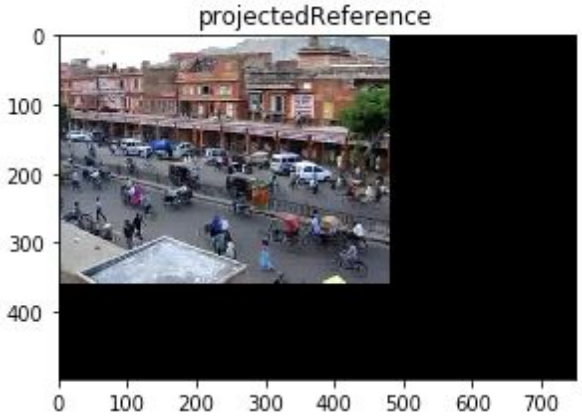
MP5 - Video Stitching and Processing

Report Prompt

In each part, describe any special steps that you took or difficulties encountered. Include these images/videos:

- Part 1: correspondence images and blended image. (25 pts)
- Part 2: panorama from five key frames (10 pts)
- Part 3: video of mapping to reference frame (15 pts)
- Part 4: panorama of background pixels (15 pts)
- Part 5: video of background pixels (should look like input movie, but with foreground removed) (10 pts)
- Part 6: video showing foreground pixels (complement to part 5) (15 pts)
- Bells&Whistles: include required results and description of how you obtained them

Part 1: Correspondence Images and Blended image. (25 pts)

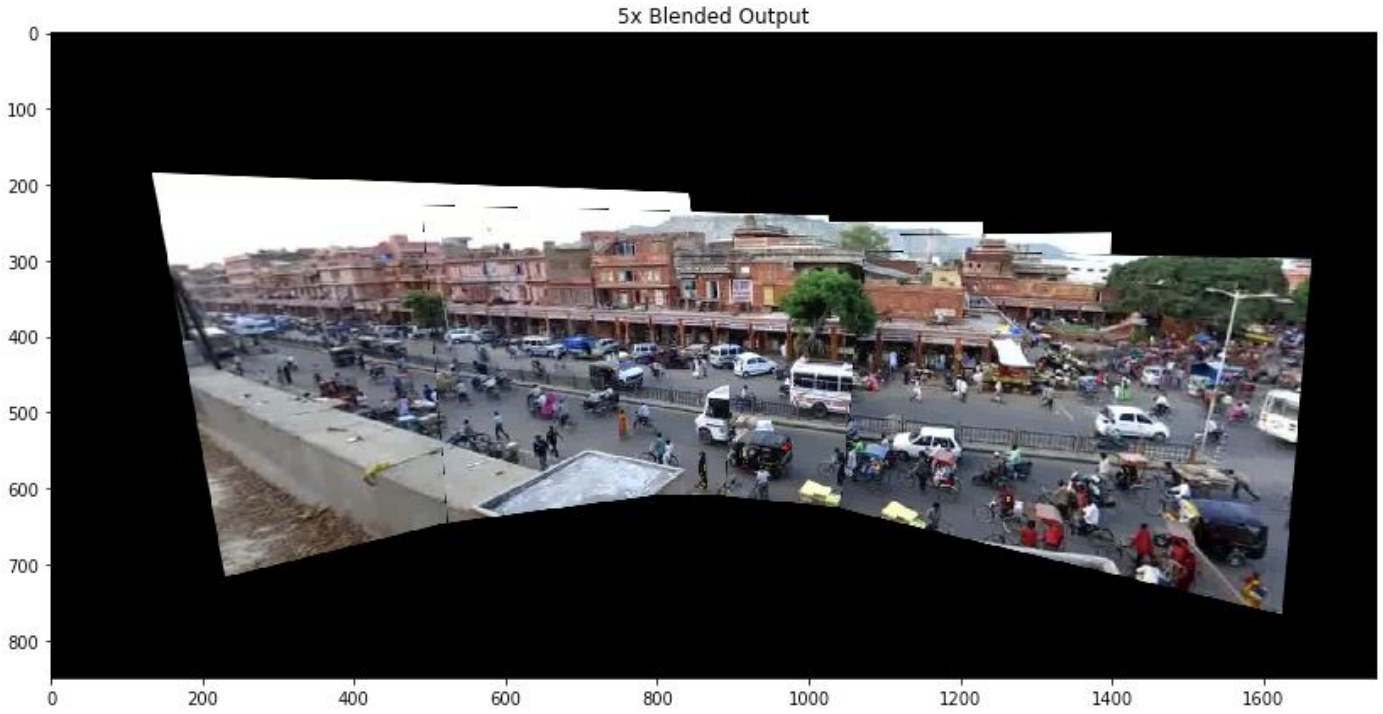
Check	Blended Output / Image
ProjectedSource 	Projected Reference 

Part 2: Panorama from five key frames (10 pts)

Steps: I first setup the 270 and 630 key frames around the frame 450 / reference frame. Then I went about figuring out how to map frame 90 to frame 450 by computing a project from 90 to 270 and then from 270 to 450, making to to multiply the matrices. I did this similarly for 450 to 630 to 810.

Additional time spent playing around or breaking the sequence: I played around with differences between projectedWidth and projectedHeight, different combinations of

blending images (outside of the asked steps) to see how they would be blended. I also tried not multiplying the matrices on either side of the frame 450.



Part 3: Video of Mapping to Reference Frame (15 pts)

Steps: I found included instructions useful and made sure to incorporate these in Jupyter notebook. In addition, I found they were really helpful when I moved on the future parts.

Youtube Link: https://youtu.be/2UXcUwjRBrs

Part 4: Panorama of background pixels (15 pts)

Continuing on from Part 3, I used median to identify the background color of each pixel and come up with the following result.

Part 5: Video of background pixels (should look like input movie, but with foreground removed) (10 pts)

Steps: In the instructions and tips, I saw that I should be able to reuse the homographies I estimated on part 3, so I grabbed those homographies and panorama picture from Part 4, and then generated frames for the entire movie.

My first iteration was a bit strange. I got the intended output of removing the foreground and moving objects, but at a way wider projection from the original, as if the camera was at the 810 reference frame and rotated on that origin. I'll put this return in a B&W Section, for "Generate a Wide Video", as my original projectedWidth and projectedHeight are at least 50% wider, since it does fulfill the requirements of that video. As I tinkered with the width and height, I found that I eventually got to the type of output I wanted.

A difficulty is when I worked on the various parts of the project over multiple days or if the kernel crashed (which was often), so that I'd have to kick off Part 3 again to get the saved homographies before working on Part 5 and 6, wasting dozens of minutes.

Youtube Link: https://youtu.be/v5f94sxylbM

Part 6: Video showing foreground pixels (complement to part 5) (15 pts)

Steps: For this foreground video, I grabbed the results from my part 5, checked the differences between the original and background to determine the foreground pixels. With that, I then generated the movie. For me it was similar to my Step 5 work, but

Youtube Link: https://youtu.be/WpV5FKteMsU

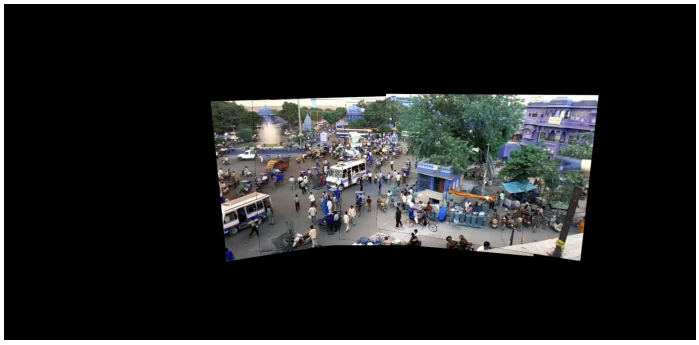
Bells and Whistles

Generate a wide video [10 pts]

- Steps
  - Used Panorama background and projected to each frame plane
  - At least 50% wider -> 1750/480 = 3.65x wider
  - Wide = projectedWidth = 1750 & projectedHeight = 850
  - Original = 480 x 360
- Youtube Link: https://youtu.be/Yr1P9w8vmCQ

Process two more videos [up to 40 points]

- Did one additional video: the last 722 frames from the sample1.mp4
- Part 1 + 2's Correspondence imsages, Blended Output + Panorama

ProjectedSource 	Projected Reference 
Panorama 	Blended Output / Image 

- Part 3
  - Youtube Link: https://youtu.be/4ZRPo0yqURo
- Part 4

- Part 5
  - Youtube Link: https://youtu.be/f6Fp_KpMmgU
- Part 6
  - Youtube Link: https://youtu.be/zrsqLBDygL0

Expected Points Outline

The core assignment is worth 100 points, as follows:

- Part 1: correspondence images and blended image. (25 pts)
    - Done, images above
- Part 2: panorama from five key frames (10 pts)
    - Done, image above
- Part 3: video of mapping to reference frame (15 pts)
    - Done, link above
- Part 4: panorama of background pixels (15 pts)
    - Done, image above
- Part 5: video of background pixels (should look like input movie, but with foreground removed) (10 pts)
    - Done, link above
- Part 6: video showing foreground pixels (complement to part 5) (15 pts)
    - Done, link above
- 10 points for quality of results and clarity of presentation.
    - Done. Up to 10 points

B&W

- 20 for second video
- 10 for generate a wide video

Regular: 25+10+15+15+10+15+10 = 100
Bells and Whistles: 20 + 10 = 30