What I need:

- A pdf file with all requested visualization of your results and a discussion of your solutions
- A zip file with your source code
- A zip file with your generated outputs

1. Feature Detection: The goal is to be able to compute the features of an image and to compute a correlation of these features

a) Implement the Harris corner detector for a gray value image. You should compute the "cornerness" response function of each point based on the second moment matrix. The final feature selection will then pick the 1000 strongest points as the features of the image. Execute this detector on greyscale versions of the two images in the TwoViewAlignment data subdirectory. Include the results in your report.
b) As you can observe in step one typically the selected features cluster. To avoid this behavior implement a non-maxima suppression. Include the results in your report.
c) Compute a patch similarity measure (e.g. SSD, NCC) of your choice for every feature in the left image to every feature in the right image. Plot the correspondences of the best N=20 matching features (e.g. put both images side by side with lines connecting the correspondences). Include the results in your report. Discuss difference between using SSD and NCC.
d) Rotate (in plane) one of the two images by 45 degrees and compare the results. Explain the difference in performance. Moreover, experiment with different rotation angles to determine what is the level of sensitivity of the similarity measures being used. Finally, discuss what can be done to remedy the situation. You may use MATLAB imrotate() function to transform one of the images

2. Two View Image Alignment: The goal is to align images into a panorama

a) Using the feature detection code in the problem 1, build a set of putative feature correspondences using the following rules: a1) Selected the top 20 features based on the similarity measure score; a2) Select 30 random correspondences.
b) Implement a RANSAC-based method to estimate an affine transformation between uttower_left.jpg and uttower_right.jpg in the TwoViewAlignment directory. First, run using as input only the putative correspondences defined in a1. Second use the aggregate putative correspondences of BOTH a1 AND a2. Show the inlier matches determined by RANSAC procedure (with adaptive iteration number) and compute their average feature reprojection error between the images. Discuss what is the expected number of RANSAC iterations for each experiment and what is the actual number observed in practice. Include the results in your report.
c) Warp one image onto the other using the affine transformation estimates. To do this, you will need to learn about MATLAB maketform and imtransform functions (or their python/C counterparts). Create a new image big enough to hold the panorama and composite the two images into it. You may composite by simply averaging the pixel values where the two images overlap. Include the results in your report.

d) Compensate for the color variation among both images in order to mitigate the apparent “color edge” among the two images in the composite RGB image. Include the results in your report.