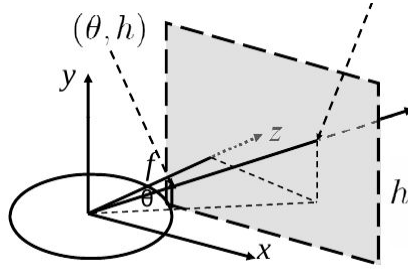# CIS 581 Project 3A Extra Credit: Cylindrical Panorama

-Arnav Dhamija and Saumya Shah

This was primarily done by projecting the given source images onto a cylindrical surface of a given radius. The cylindrical projections were obtained using the following equations:

(The above picture is from a document by UWisc professor Charles Dyer)

$$x' = f * tan^{-1}((x - x_c)/f) + x_c$$

$$y' = (y - y_c) * cos(tan^{-1}((x - x_c)/f)) + y_c$$

Here x_c, y_c are the center points in image coordinate frames, x', y' are the transformed coordinates in unwrapped cylindrical projection image and x, y are the coordinates in the original image and f is the focal length of the camera.

These equations give the transformed coordinates from the real image to the cylindrical projection. To avoid the holes in the final image, inverse transformation was applied to map and interpolate the pixel values from the final image to the given image.

The inverse transformations are given as:

$$x = tan((x' - x_c)/f) * f + x_c$$

$$y = (y' - y_c) * (\sqrt{(x - x_c)^2 + f^2})/f + y_c$$

The images were transformed to their cylindrical projections using the above transformations and the results for the Franklin field image obtained are as shown below:
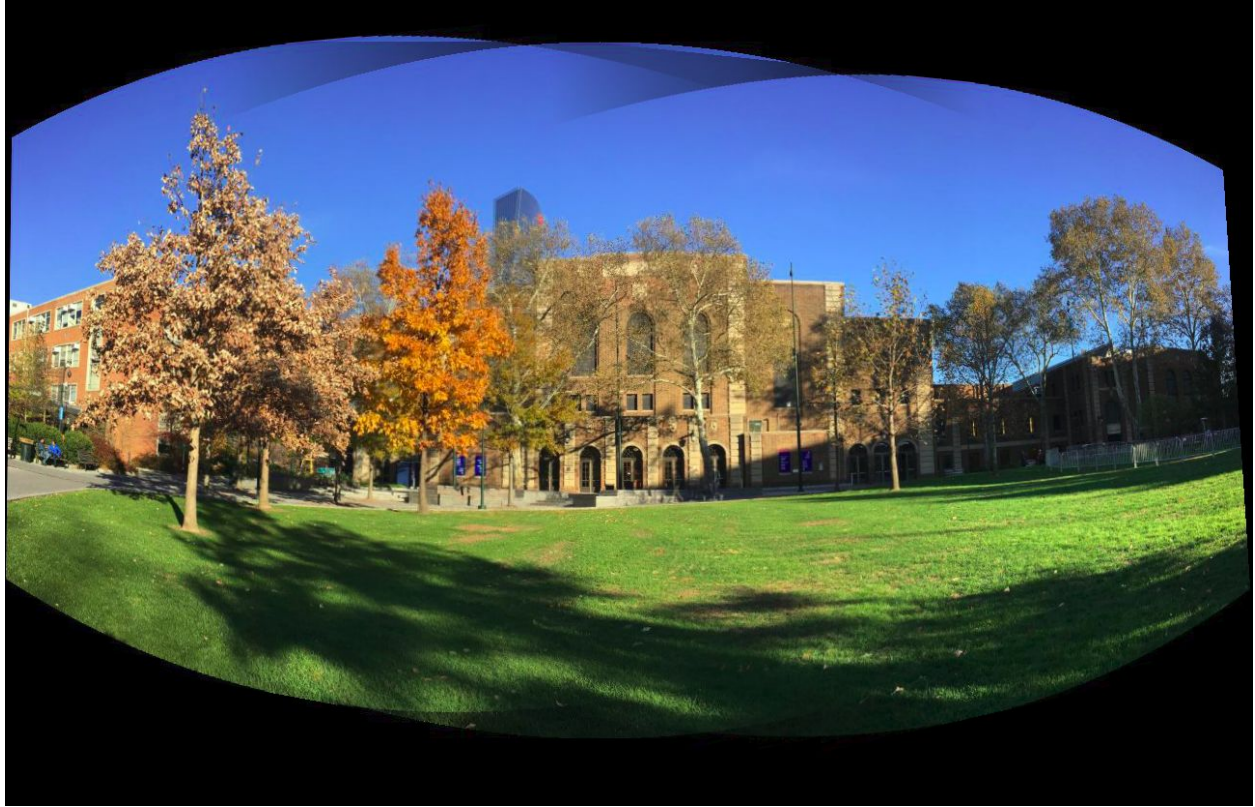
Cylindrical Projection of the left image

Cylindrical projection of middle image

Cylindrical projection of the right image

The final cylindrical panorama

The file get_cylindrical.py generates the projections of the images which are then used for stitching and generating the final cylindrical panorama. The black arcs in the images are due to the feathering effect on the black portion of the images which was due to the shrinkage/warping of the images when projected onto the cylinder.

The other test images can be found in the images folder and the results of cylindrical projections and the output of stitching are in the results folder. Each of the subfolders in the results folder contain the intermediate results from corner detector, anms, and feature matching before and after RANSAC. The instructions to run the program can be found in the README file.