Homework 3 - Segmentation and Homography

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Question 3 - Planar Homographies

3.0 - SIFT

Figure 1: Descriptor Points on Chickenbroth Model and Counter Images

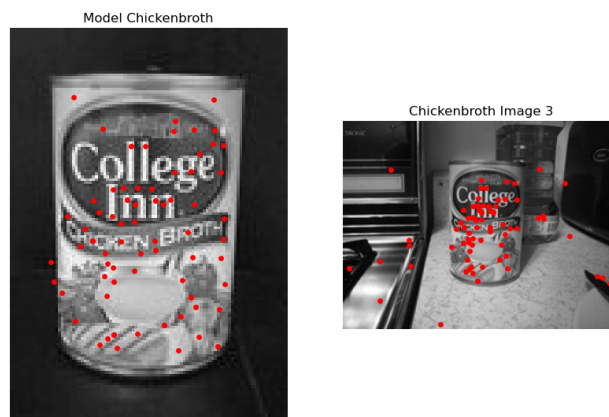### 3.1 - Finding Corresponding Points Using SIFT

Figure 2: Corresponding Points on Chickenbroth Model and Counter Images

3.2 - Calculating Transformation

The implemented function to find the homography matrix performs the following steps:

1. From given points, constructs the A matrix as seen in lecture. For each point, two rows are defined:

$$A = \begin{bmatrix} -x & -y & -1 & 0 & 0 & 0 & x'x & x'y & x' \\ 0 & 0 & 0 & -x & -y & -1 & y'x & y'y & y' \end{bmatrix}$$

2. Calculate the SVD decomposition of A.

3. Find the minimal singular value and its corresponding column in V.

4. Reshape the column to a 3×3 matrix H and return it.

The result is projected using the matrix, returned to heterogeneous coordinates and displayed in the image. The result is shown in Figure 3.
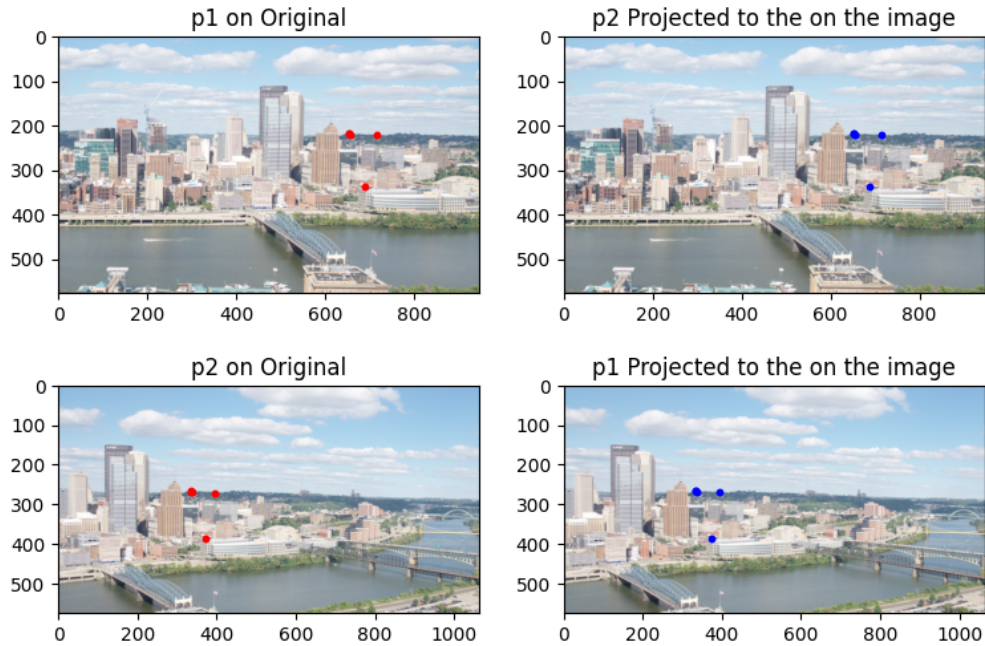

Figure 3: Homography Transformation of Incline Panorama Images

3.3 - Image Warping

3.4 - Panorama Stitching

3.5 - Several Image Stitching

3.6 - RANSAC

3.7 - Creating Our Own Panorama