Kevin Quizhpi HW2 Problem 2

In this problem we are transforming a side view of a hill boarrd to a frontal view

Each point p in the original is related to p' in the frontal view by a homography H

$$p' = Hp$$

$$p' \Rightarrow \begin{bmatrix} x' \\ y' \\ w' \end{bmatrix} = \begin{bmatrix} H_1 & H_2 & H_3 \\ H_4 & H_5 & H_6 \\ H_7 & H_8 & H_9 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

where x, y are the original points

Through multiplication & division of w' we will arrive at a

$$\cdot Aq = 0 \quad \text{form}$$

where A = 2N x 9 matrix, N = # of points

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

and q is a vectorized version of our H matrix

To find H we find the SVD of A, 8x9

The last column of V is our Homography matrix