CS-663 Assignment-1 Report

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1 Question-6

1.1 Taking input and showing input image

Figure 1: Image1 given by imshow.

Figure 2: Image2 given by imshow.

1.2 Finding affine matrix

Created two matrices A and b corresponding to coordinate points from first image and second image respectively and

$$\begin{pmatrix} A_{11} & A_{12} & t_x \\ A_{21} & A_{22} & t_y \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x_1 & x_2 & \cdots & x_k \\ y_1 & y_2 & \cdots & y_k \\ 1 & 1 & \cdots & 1 \end{pmatrix} = \begin{pmatrix} X_1 & X_2 & \cdots & X_k \\ Y_1 & Y_2 & \cdots & Y_k \\ 1 & 1 & \cdots & 1 \end{pmatrix}$$

$$affinematrix = b * pinv(A)$$

where pinv is pseudo inverse $= (A^T(AA^T)^{-1})$.

1.3 Nearest neighbour interpolation.

Used back-wraping at each index and subtituted intensity at nearest pixel.

Figure 3: Original image

Figure 4: Target image

Figure 5: Transformed image

1.4 Bilinear interpolation

Used back-wraping at each index and subtituted intensity by using bipolar interpolation.

Figure 6: Original image

Figure 7: Target image

Figure 8: Transformed image

1.5 What if points are collinear

If all the points are collinear we **miss out on the information of changes in other directions** which will effect scaling,sheer, component of translation in other directions.In that case mathlab finds some solution which would fit for these points but may not for others as these **perfectly wouldn't represent the whole image**.

Figure 9: Target image

Figure 10: Nearest neighbour interpolation

Figure 11: Bilinear interpolation

These are the images obtained by taking top of pillars like structures as control points.We can see that the top points of pillars match but others are very distorted.