Question 5

CS663 (Digital Image Processing) Assignment 1

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PART

I

Question 5

Section 1

Part (c) - Image Comparison (Nearest Neighbour)

Following are the input images ('goi1.jpg' and 'goi2.jpg') and the first image wrapped with the affine transformation matrix using nearest neighbor interpolation:

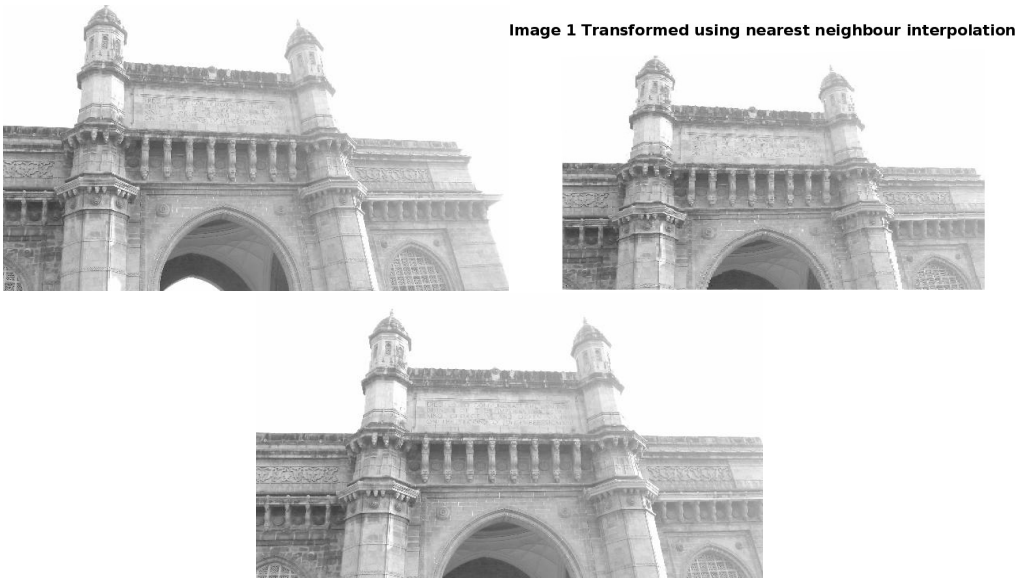

Figure 1. Image1, Image1 after transformation (Nearest Neighbour), Image2

Section 2

Part (d) - Image Comparison (Bilinear)

Following are the input images ('goi1.jpg' and 'goi2.jpg') and the first image wrapped with the affine transformation matrix using bilinear interpolation:

Figure 2. Image1, Image1 after transformation (Bilinear), Image2

Section 3

Part (e) - Effect of selecting collinear points

In the first step, if the 12 points chosen in the first image are collinear, it will have a significant effect on the estimation of the affine transformation matrix.

Collinear points provide very limited information about the transformation. In the context of an affine transformation, they won't be able to capture both scaling and rotation components, as all points lie along the same line. Instead, the transformation matrix will likely reflect only the translation component, since the translation parameters won't be affected by the collinearity of the points.

- The rotation, scaling, and shear components of the affine transformation matrix will not be accurately estimated.
- The resulting affine transformation will be dominated by translation, which means that the warped image will essentially be shifted along the line formed by the collinear points.

To accurately estimate an affine transformation matrix, it's crucial to select points that provide diverse and well-distributed information across the image, rather than points that lie on a single line. This diversity allows the estimation algorithm to capture the full range of transformation components, including rotation, scaling, and shear, resulting in a more meaningful transformation that can accurately align the two images.