Assignment 1: CS 663, Fall 2023

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Due: 25th August before 11:55 pm

Q5. (c)

goi1.jpg

goi2.jpg

Nearest Neighbour Interpolation of goi1.jpg

(d)

goi1.jpg

goi2.jpg

Bilinear Interpolation of goi1.jpg

(e) If all the n points selected are collinear (i.e they all lie on a straight line) then the system of linear equations

$$\begin{bmatrix} x_{21} & x_{22} & .. & x_{2n} \\ y_{21} & y_{22} & .. & y_{2n} \\ 1 & 1 & .. & 1 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} & t_x \\ A_{21} & A_{22} & t_y \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_{11} & x_{12} & .. & x_{1n} \\ y_{11} & y_{12} & .. & y_{1n} \\ 1 & 1 & .. & 1 \end{bmatrix}$$

$$X_2 = AX_1$$

becomes underactuated, as the rank of X_1 reduces to 2. While solving for A we multiply by X_1^T, which leaves us with $X_2X_1^T = AX_1X_1^T$. As $X_1X_1^T$ is non invertible there are infinitely many solutions of A. Thus the affine transformation matrix obtained can be any of those solutions. In the revese warping procedure, inverse transformation matrix A^{-1} maps the destination image to the line in the original image