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Computer Vision, Spring 2021

Professor Nayar

Homework 4 – written assignment

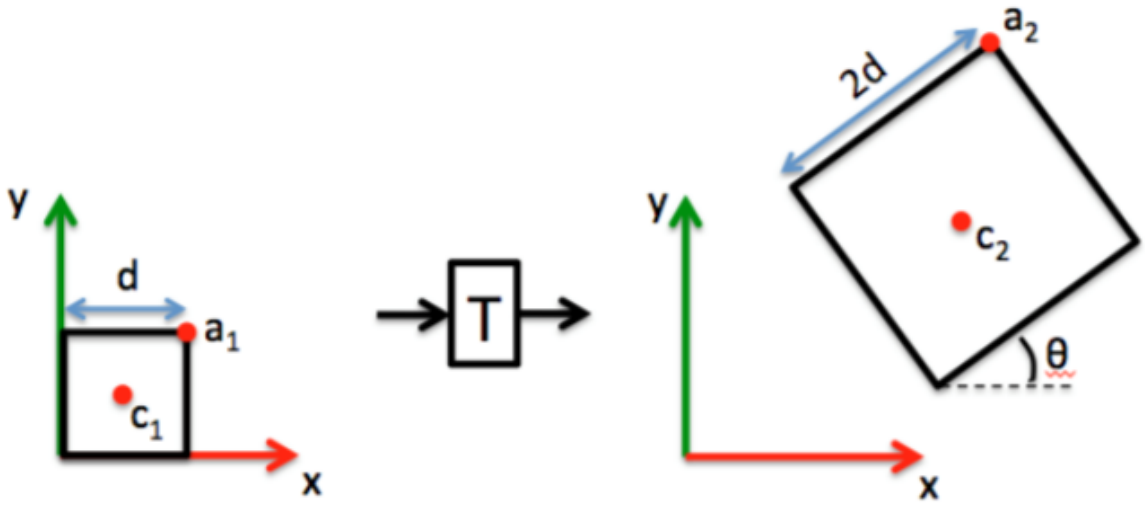

Figure 1

The transformation matrix T from the figure 1 can be written as a chain of 3 matrices each of which has a single function:

T = S M R

Where, S is scaling matrix, M is translation matrix and R is rotation matrix.

$$S = \begin{bmatrix} s_x & 0 & 0 \\ 0 & s_y & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$M = \begin{bmatrix} 0 & 0 & t_x \\ 0 & 0 & t_y \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & x_2 - x_1 \\ 0 & 0 & y_2 - y_1 \\ 0 & 0 & 1 \end{bmatrix}$$

$$R = \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$