OPT- $u = \begin{bmatrix} x_1 \\ y_1 \\ x_2 \\ y_2 \\ \vdots \\ x_{T-1} \\ y_{T-1} \end{bmatrix}$

$$Cost = u^T u$$

$$\sum u_x = x_{goal} - x_{start}$$

$$\sum u_y = y_{goal} - y_{start}$$

(c) $\min \sum u^T u$

subject to: $\mu^+ = \mu + u$

$\sigma^+ = \sigma$ + transition noise

$K = \sigma^+ (\sigma^+ + \sigma_M)^{-1}$

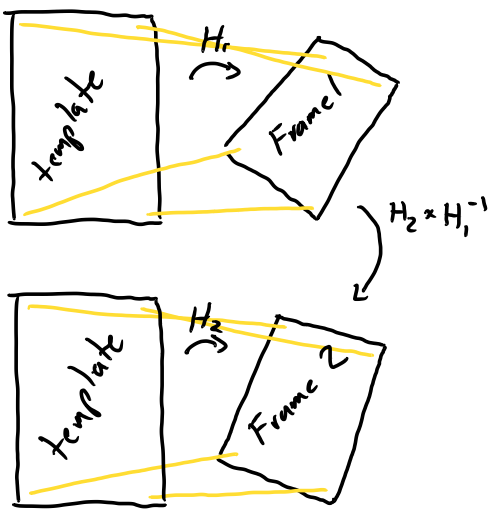
$\sigma = (I - K)\sigma^+$

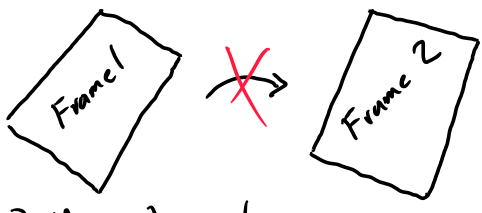
$\sigma^2_{goal} - 0.01 \leq 0$

$\sum u = \mu_{goal} - \mu_{start}$

$X = [x_{x_1} \; x_{y_1} \; u_{x_1} \; u_{y_1} \; \dots \; x_{x_T} \; x_{y_T}]$

V1 -





Better to always compare to book cover template because there are FAR fewer outliers. There is no background that can be matched from frame to frame.

(e) the program fails when the book is rotated too much so the face is no longer mostly parallel to the image plane

V2 - (c) I rotate the point cloud by an initial random translation and rotation.
Adding random noise to a variance of 0.01 was still okay for accurate matching.

A transformation like this is very hard for ICP to solve. I downloaded some point cloud data from University of Dayton and from Swiss 3D Cities. Both datasets are very difficult to perform ICP. I will be submitting my results with extra credit.