

Types of Trackers

Kalman Filter : Predicts the output of the next time step along with uncertainty based on its previous measurements.

Particle Filtering: computes posterior distributions using a set of given likelihood to find a new state.

Super Pixel - A **superpixel** can be defined as a group of pixels that share common characteristics (like pixel intensity).

Tracking Using Matching

- NCC : Basically find the NCC b/w template and all image candidates....and the one with the highest cc is the new target location (No change in target template in this).
- KLT (affine-transform matching) : Affine transformation from previous frame to current frame
- KAT (appearance predicted matching) : the template is updated with the newly predicted target...kalman filter basically predicts the output of next time step with its uncertainty based on previous measurements. (can handle occlusion by converting into 20x20)
- FRT (ensemble of patches matching): Target is not updated. Basically divides your bounding box into patches to handle occlusion and pose changes. The previous and current compared by earth Mover's Distance. (Distance b/w 2 prob. Distributions) For being robust ...25% smallest score is selected
- MST () : Always uses the first histogram (No Update). Represents target by RGB Histogram. Thus works well with shape changes..the one with lowest bhattachary distance is selected (similarity b/w 2 distributions) (Mean shift is used to find the mode of the function)
- LOT : doubt :(

Tracking using Discriminative Classification

Build a classifier to distinguish from target pixels to background pixels. Classifier updates as new samples come in.

1. Foreground -Background Tracker - linear classifier based on the gabor texture features from target and background region. Highest classification determines the new position of target
2. Hough- Based Tracking- Basically for non-rigid targets as bounding boxes for these objects will have many false pixel labels. This approach is a discriminative classifier with segmentation. Thus we use Hough Forest (backpropagation). It gives a probability map of the target. The one with highest is selected as center of target ..sparse pixels are used for segmenting the target by grabcut algorithm
3. Super Pixel Tracking - Purpose is to handle changes scale, motion and shape with occlusion. Use MST to group super pixels based on the super pixel histogram whose cluster confidence is defined by the overlap of cluster with target bounding box.