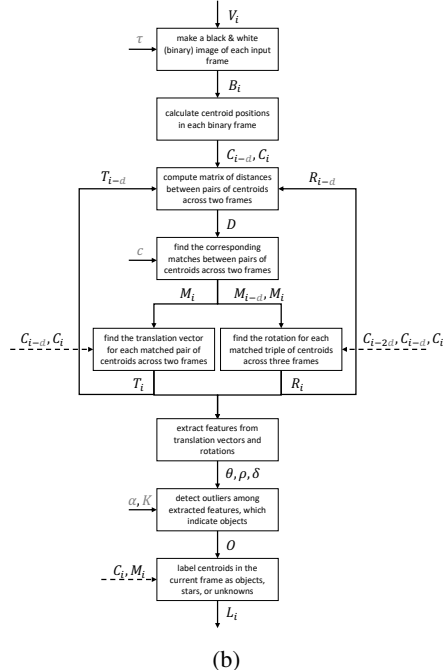


# Block Diagram Notations:

- $V_i \rightarrow i^{th}$  intensity/gray-scale video frame (in the block diagram,  $V_i$  refers to the current frame, and  $V_{i-d}$  refers to the  $d^{th}$  frame before the current frame).
- $\tau \rightarrow$  Threshold value selected to make a black and white (binary) image from the intensity image.
- $B_i \rightarrow i^{th}$  black and white (binary) frame.
- $C_i \rightarrow$  Spot centroids for the  $i^{th}$  binary frame.
- $D \rightarrow$  Distance matrix.  $D_{p,q} \rightarrow$  Euclidean distance between the  $p^{th}$  spot centroid in the previous frame with  $q^{th}$  spot centroid of current frame.
- $c \rightarrow$  Cost value selected for labeling a spot as 'Unknown' (no matching found).
- $M_i \rightarrow$  Matches contains  $(p,q)$  pairs such that  $p^{th}$  spot centroid in the previous frame is matched with the  $q^{th}$  spot centroid in the current frame.
- $T_i \rightarrow$  Translation vectors calculated for the  $i^{th}$  frame. For each matched pair, there is a translation vector defined from the centroid in the previous frame to the matched centroid in the current frame.
- $R_i \rightarrow$  Rotations calculated for the  $i^{th}$  frame. For each matched triple in three consecutive frames, there is a rotation defined from the centroid in the previous frame to the matched centroid in the current frame.
- $[\theta, \rho, \delta] \rightarrow$  Translation directions  $\theta$ , translation magnitudes  $\rho$ , and distance from median of center of rotations  $\delta$  are extracted classification features.
- $O \rightarrow$  Outliers is a logical array whose elements are true when an outlier is detected in the corresponding extracted features.
- $\alpha \rightarrow$  Significance level is the probability of the study rejecting the null hypothesis, given that the null hypothesis were true.
- $K \rightarrow$  Maximum outlier count specifies the maximum number (upper bound) of outliers returned by the method.
- $L_i \rightarrow$  Label of the spots in the  $i^{th}$  frame. Each label could be 'Object', 'Star', or 'Unknown'.

(a)



(b)