

Initialize tracker:

Select rectangular  $R_1$  ROI in  $I_1$

Initialize model covariance  $M_{T_0}$

Initialize model covariance speed  $S_{T_0}$

Initialize  $R_{T_0} = R_1 = (x_{T_0}, y_{T_0}, w_{T_0}, h_{T_0})$

$t \leftarrow T_0 + 1$

Read image  $I_t$

Create image feature  $F_t$

Local search  $(\Delta_x, \Delta_y, \Delta_w, \Delta_h)$ :

Select  $R$  that minimizes the distance  $D(C_R, S_R; M_{t-1}, S_{t-1})$

for  $R(x, y, w, h)$  such that

$y \in [y_{t-1} - \Delta_y, y_{t-1} + \Delta_y]$ ,  $x \in [x_{t-1} - \Delta_x, x_{t-1} + \Delta_x]$ ,

$h \in [h_{t-1} - \Delta_h, h_{t-1} + \Delta_h]$ ,  $w \in [w_{t-1} - \Delta_w, w_{t-1} + \Delta_w]$

I.e., Get covariance matrix  $C_R$  from  $R(x, y, w, h)$  and

calculate covariance matrix speed  $S_R$  from  $C_R$  and  $S_{t-1}$

At the end of local search, get best region  $R$  with covariance feature  $C_R$  and  $S_R$

Update ROI  $R_t$  model:  $M_t$  and  $S_t$

$t \leftarrow t + 1$