Supplemental Materials

1. Optical Flow Parameter

This section provides the detailed overview of optical flow parameters used in our experimental evaluations.

- **FlowFields**: This algorithm is a sparse-to-dense approach and combines the sparsified FlowFields [1][1] correspondences with the edge-preserving optical flow interpolation method EPIC [6][2] to obtain a dense optical flow field. The FlowFields parameter are set to: patch radius $r = 8$, $r2 = 6$, $k = 3$, $e = 7$, $s = 50$ and $\epsilon = 5$. For the EPIC interpolation the following parameters have been used: nn_{pref}= 15, $nn = 65$, $coef_{kernel} = 0.2$, $niter_{outer} = 25$, $\alpha = 1$, $\gamma = 0.72$, $\delta = 0$ and $\sigma = 1.1$.

- **CPM**: Similar to FlowFields based on the EPIC interpolation (using same parameters) but based on efficient PatchMatch [4] feature correspondences[3]. The following parameter have been used: step = 3, maximal iterations = 8, stop iteration ration = 0.05, pyd ratio = 0.5, maximal allowed displacements = 400, forward backward threshold = 3, border width = 5.

- **RIC**: This method combines CPM correspondences with a novel segmentation-based flow interpolation method [3][4]. The results presented has been computed with the following parameters: super-pixel size = 20, number of support neighbors = 150 and a variational refinement with $\alpha = 20$, $\omega = 1.9$, $\Delta = 5$, $\gamma = 10$, one fixed point iteration and one SOR iteration.

- **DeepFlow**: The DeepFlow [7][5] method has configured with the following parameters: $\alpha = 1.0$, $\beta = 0.6$, $\gamma = 1.09$, $\Delta = 0.40$, $\sigma = 0.60$, $bk = 0.0$, $\eta = 0.95$, minimum size = 25, number of inner iterations =5, number of solver iterations = 25 and $\omega_{SOR} = 1.6$.

- **RLOF**: The RLOF [2][6] computes motion vectors on a sparse regular grid of size g and applies the geodesic interpolation to estimate a dense flow field. The RLOF parameters used are: maximal number of iterations = 20, maximal levels = 5, $s_{\Omega}^{small} = 9$, $s_{\Omega}^{max} = 21$, using a linear illumination model, $\epsilon_{min} = 0.0001$, global motion RANSAC threshold = 20. $c_0 = 3.2$, $c_1 = 7$, adaptive support region the color threshold $\epsilon_{RGB} = 25$. The run-time efficient version RLOF[10] performed with $g = 10$ and the forward backward threshold = 0.41 and more accurate RLOF[6] with $g = 6$ and the forward backward threshold = 0.2.

- **DIS**: The dense inverse optical flow [5][7] has been evaluated with a fast and an accurate configuration. The fast DIS[2] configuration comes with $\theta_{sf} = 3$, $\theta_{it} = 12$, $\theta_{ps} = 8$ and $\theta_{ov} = 0.40$. The parameter of DIS[4] are: $\theta_{sf} = 0$, $\theta_{it} = 256$, $\theta_{ps} = 12$ and $\theta_{ov} = 0.75$

2. Tracking Accuracy Graphs

In our experimental evaluations, in section 5, we reported the tracking accuracy at the error threshold 15. This error threshold is the common value to provide a unique quantitative comparison. In Tables 1, a more detailed view on the long-term accuracies of our experiments will be given. Therefore, the tracking accuracy has been computed for an pixel error range up to 25 pixel and displayed in a graph. In Table 1, the tracking accuracy plots of the six optical flow methods for the UCF crowd tracking dataset are shown.

References

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[2] https://thoth.inrialpes.fr/src/epicflow/

[3] https://github.com/YinlinHu/CPM

[4] https://github.com/YinlinHu/Ric

[5] https://thoth.inrialpes.fr/src/deepflow

[6] https://github.com/tsenst/RLOFLib

[7] https://github.com/tikroeger/OF_DIS

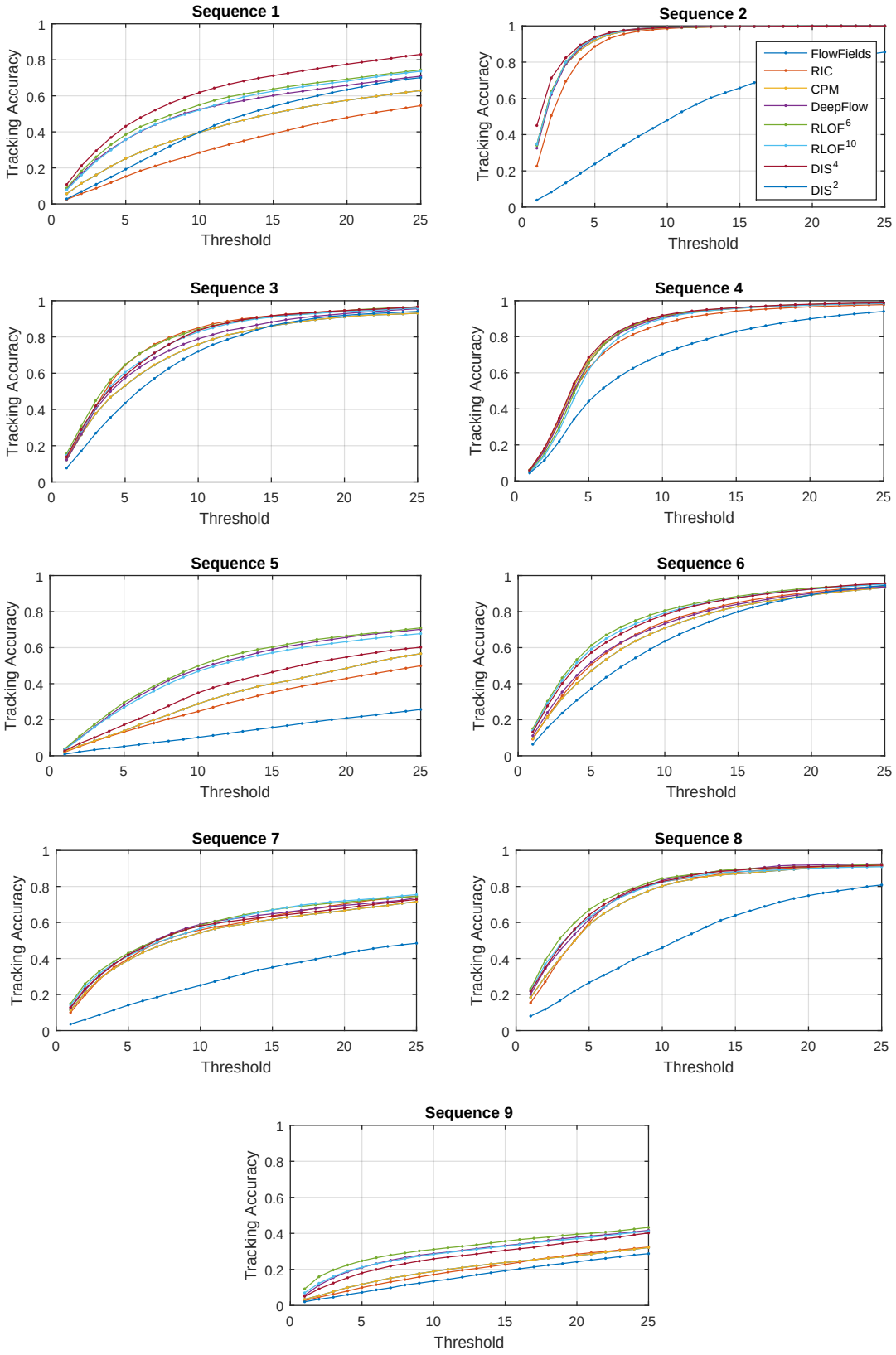

Table 1. Detailed evaluation result for the UCF crowd tracking benchmark. Each plot show the tracking accuracies versus the pixel error within the range $[1, 25]$.

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