MEEM: Robust Tracking via Multiple Experts using Entropy Minimization

Jianming Zhang, Shugao Ma, Stan Sclaroff

Department of Computer Science, Boston University, USA

We provide in this document the following statistics of MEEM and other trackers on the benchmark dataset of [1] in Experiment I and our newly collected sequences in Experiment II.

1. Fig. 1 (Experiment I): the average precision plots and the success plots for the compared trackers (LSHT [2], LSST [3] and SPLTT [4]), which are not included in [1]. For the other 29 compared trackers, readers are referred to [1].
2. Fig. 2 (Experiment I): the average precision plot ranking scores and the AUC ranking scores of the five leading trackers on different subsets of test sequences.
3. Fig. 3 and 4 (Experiment I): the precision plot ranking score tables and the AUC ranking score tables for the top five trackers.
4. Fig. 5 and 6 (Experiment I): the precision plot ranking score tables and the AUC ranking score tables for MEEM and its baselines.
5. Fig. 7 (Experiment II): the precision plot ranking score table and the AUC ranking score table for MEEM and the compared algorithms on our newly collected sequences.

Detailed explanations are included in the caption of each figure. For more information about the test sequences, evaluation protocols, and the 29 trackers evaluated in [1], readers are directed to [1] and its project website.

References

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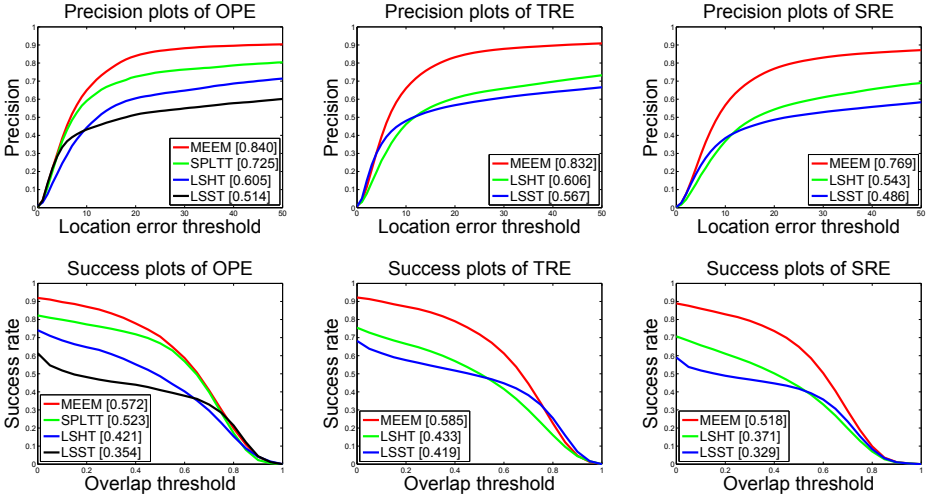

Fig. 1. Average precision plots (top row) and success plots (bottom row) of MEEM and three recent trackers not included in [1] (LSHT [2], LSST [3] and SPLTT [4]) for OPE, SRE and TRE on the benchmark dataset of [1] in Experiment I (best viewed in color). The numbers in the square brackets are the ranking scores of the trackers, averaged over all 50 test sequences. Note that the line style of a curve is determined by the ranking of the corresponding tracker in the plot, not by the name of the tracker. SPLTT is only evaluated for OPE due to limited computational resources. For the other 29 compared trackers, readers are referred to [1].

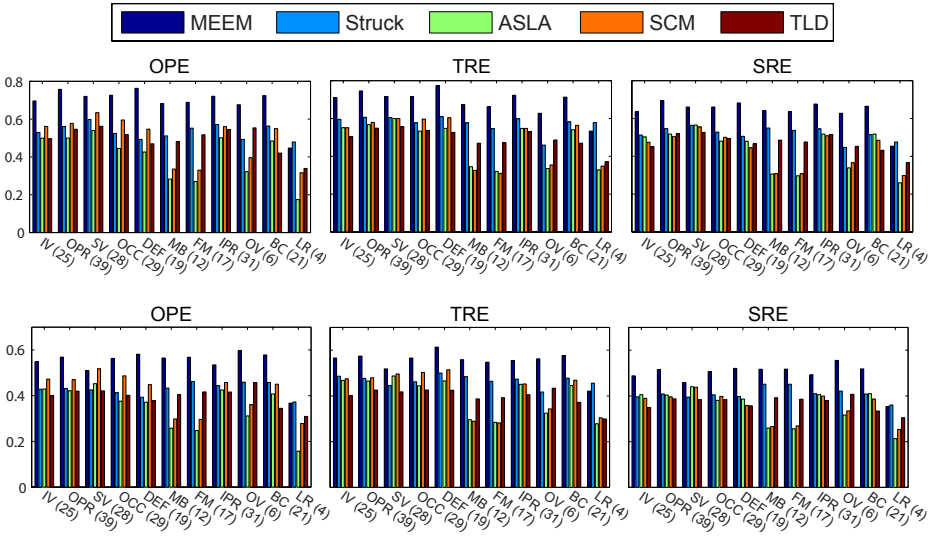

Fig. 2. Average precision plot ranking scores (top) and AUC ranking scores (bottome) of the five leading trackers on different subsets of test sequences in OPE, TRE and SRE on the benchmark dataset of [1] in Experiment I (best viewed in color). Each subset of sequences corresponds to an attribute, such as illumination variation (IV), out-of-plane rotation (OPR), scale variation (SV), occlusion (OCC), deformation (DEF), motion blur (MB), fast motion (FM), in-plane rotation (IPR), out-of-view (OV), background clutter (BC), low resolution (LR). The number after each attribute name is the number of sequences that have this attribute. Trackers displayed here are selected based on their AUC ranking scores in SRE.

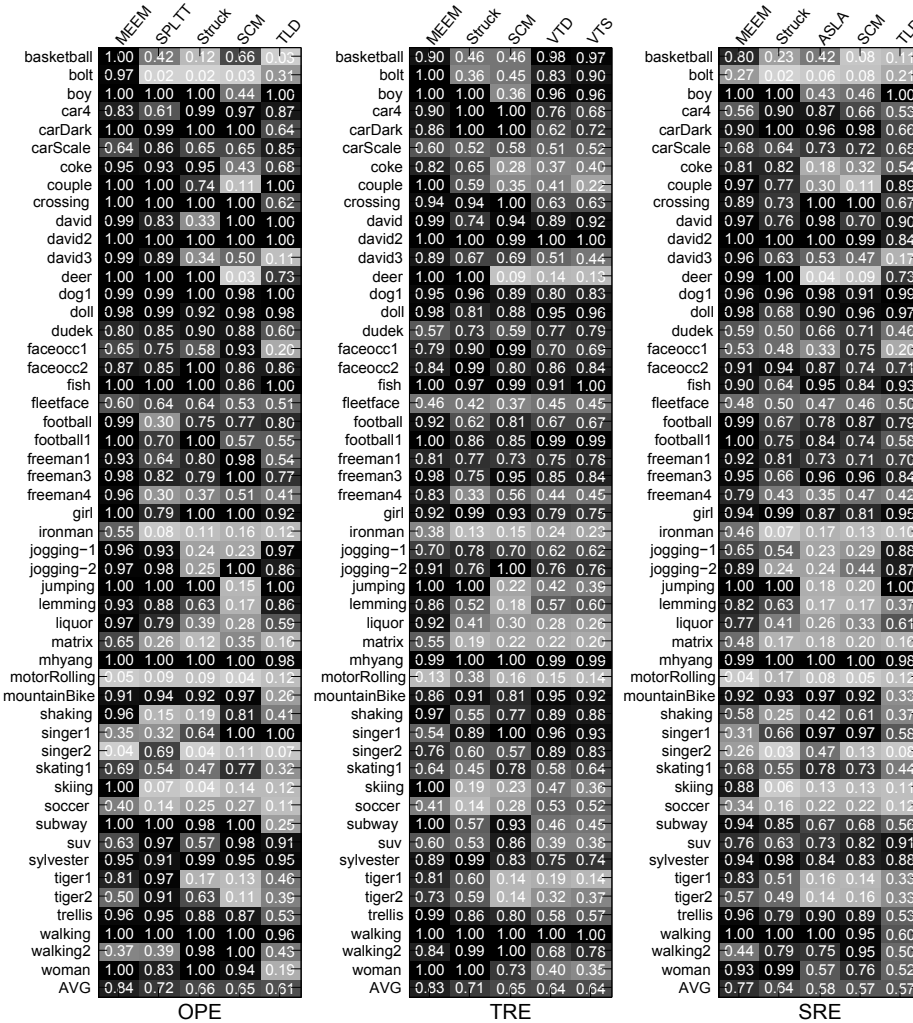

Fig. 3. Precision plot ranking scores of the top five trackers in OPE, TRE and SRE on the benchmark dataset of [1] in Experiment I. The trackers shown in this figure are SPLTT [4], Struck [5], SCM [6], TLD [7], VTD [8], VTS [9] and ASLA [10]. Our tracker tends to better handle the sequences like "basketball", "bolt", "david3", "football", "football1", "freeman4", "ironman", "lemming", "liquor", "matrix", "skiing", "soccer", "subway", "tiger1" and "tiger2", in which the target often undergoes different levels of occlusion, non-rigid motion and out-of-plane rotation.

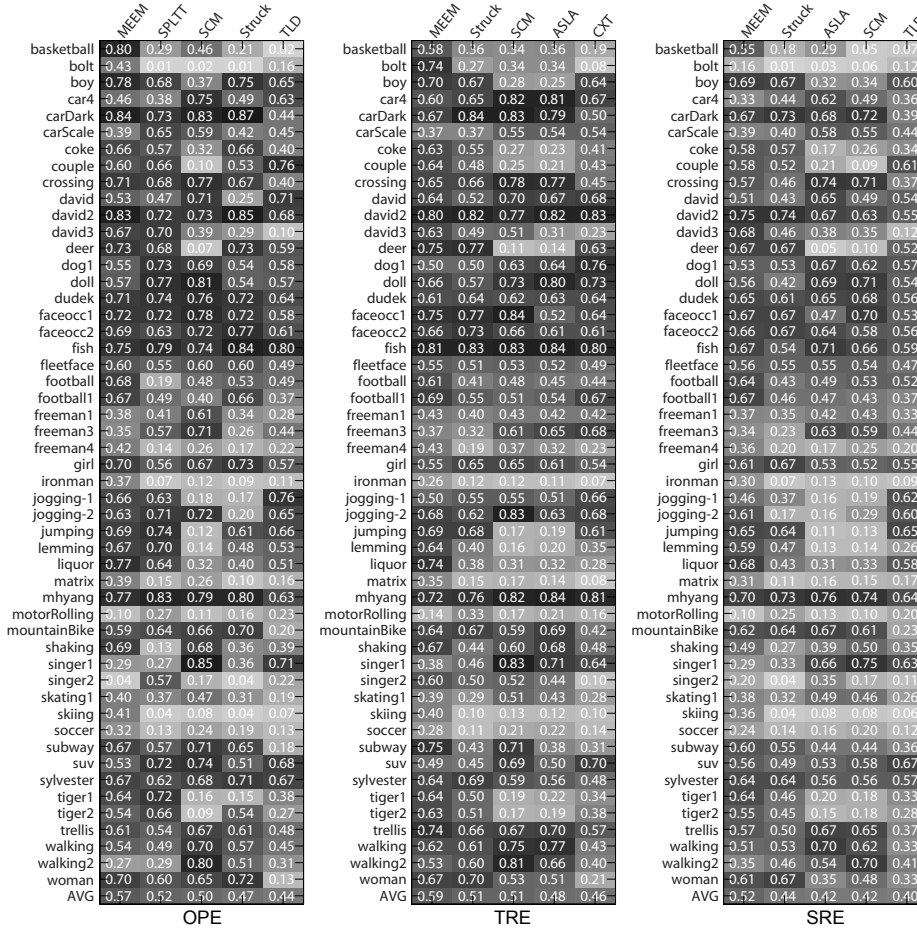

Fig. 4. AUC ranking scores of the top five trackers in OPE, TRE and SRE on the benchmark dataset of [1] in Experiment I. The trackers shown in this figure are SPLTT [4], Struck [5], SCM [6], TLD [7], ASLA [10] and CXT [11]. Our tracker tends to better handle the sequences like "basketball", "bolt", "david3", "football", "football1", "freeman4", "ironman", "lemming", "liquor", "matrix", "skiing", "soccer", "subway", "tiger1" and "tiger2", in which the target often undergoes different levels of occlusion, non-rigid motion and out-of-plane rotation.

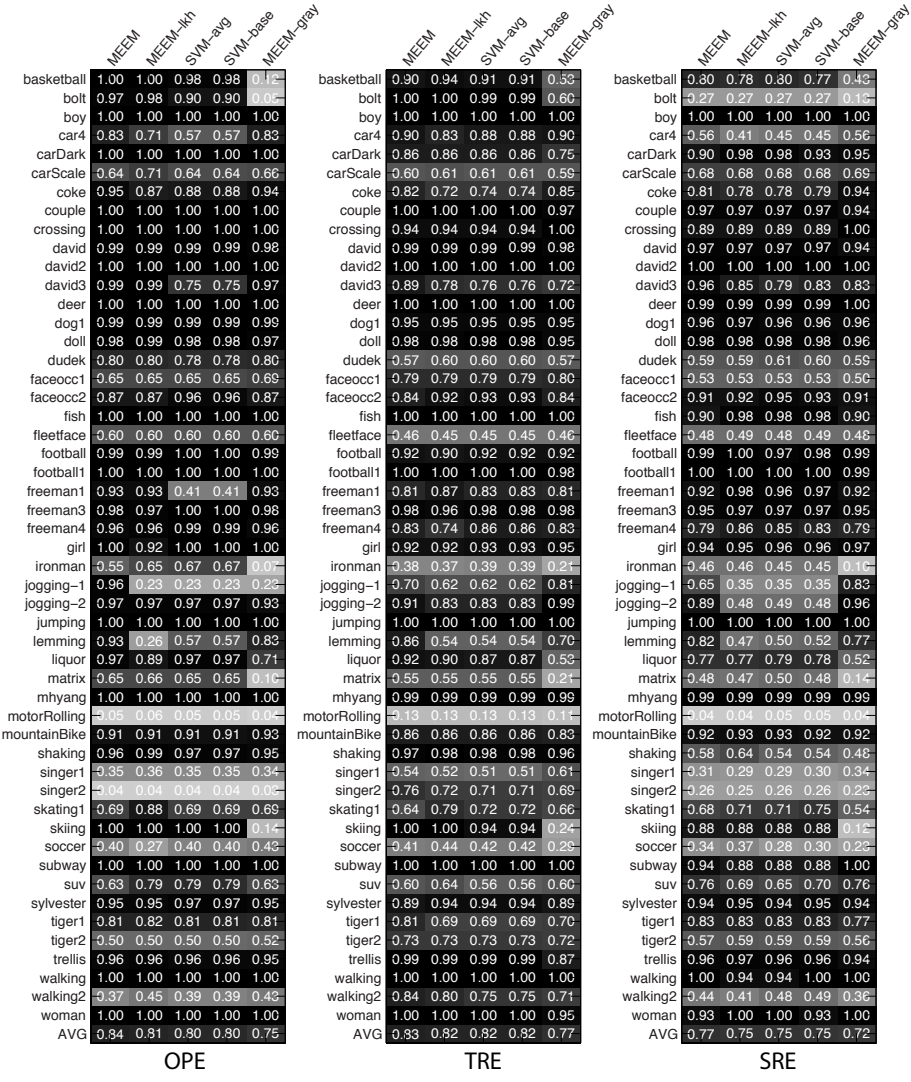

Fig. 5. Precision plot ranking scores of MEEM and its baselines in OPE, TRE and SRE on the benchmark dataset of [1] in Experiment I. Besides the baselines evaluated in our paper, we also report another baseline MEEM-gray, which is the full implementation of MEEM, but only uses the gray-scale images as input. MEEM-gray generally gives lower scores than MEEM, but on average it still compares favorably with the state-of-the-art trackers in Fig. 3. Significant improvement of MEEM over SVM-base is observed on such sequences as "david3" (OPE, TRE and SRE), "lemming" (OPE, TRE and SRE), "jogging-1" (OPE and SRE) and "jogging2" (SRE), where challenges like occlusions and large appearance variations, could lead to model drift.

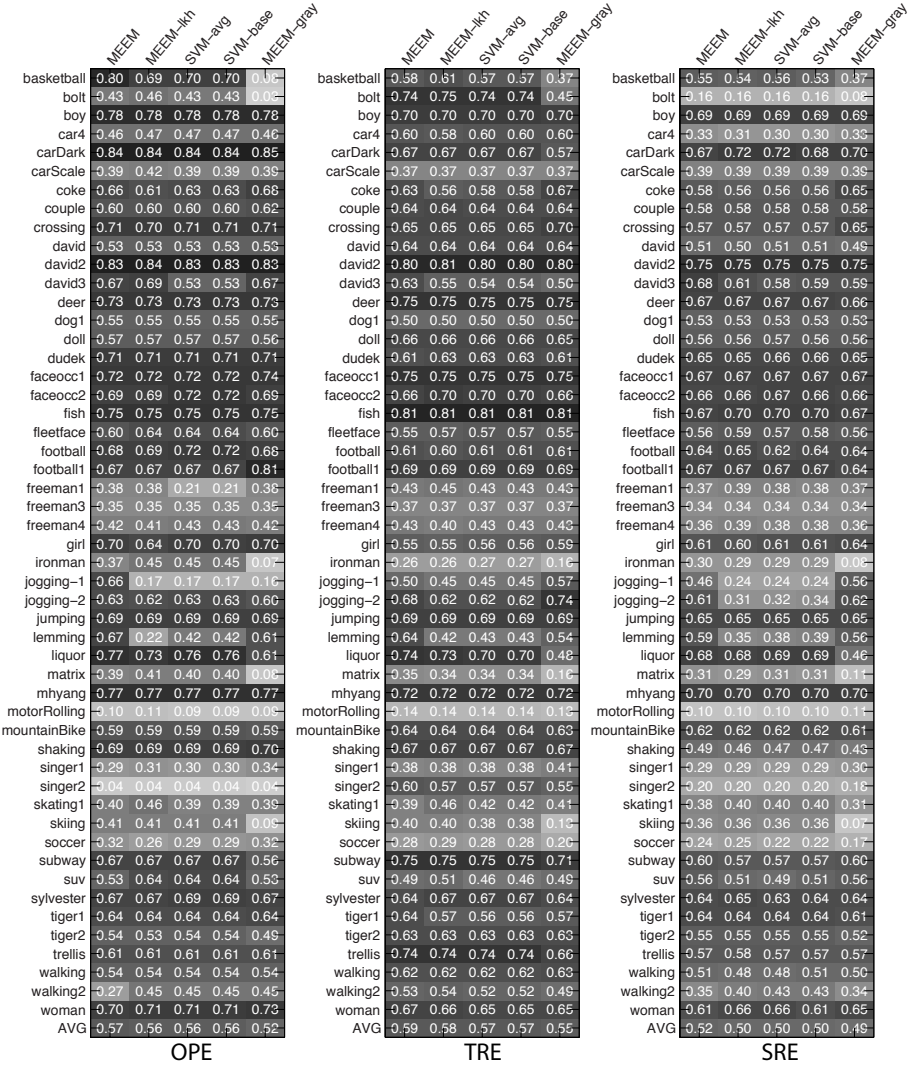

Fig. 6. AUC ranking scores of MEEM and its baselines in OPE, TRE and SRE on the benchmark dataset of [1] in Experiment I. Besides the baselines evaluated in our paper, we also report another baseline MEEM-gray, which is the full implementation of MEEM, but only uses the gray-scale images as input. MEEM-gray generally gives lower scores than MEEM, but on average it still compares favorably with most of the top trackers in Fig. 4. Significant improvement of MEEM over SVM-base is observed on such sequences as "david3" (OPE, TRE and SRE), "lemming" (OPE, TRE and SRE), "jogging-1" (OPE and SRE) and "jogging2" (SRE), where challenges like occlusions and large appearance variations, could lead to model drift.

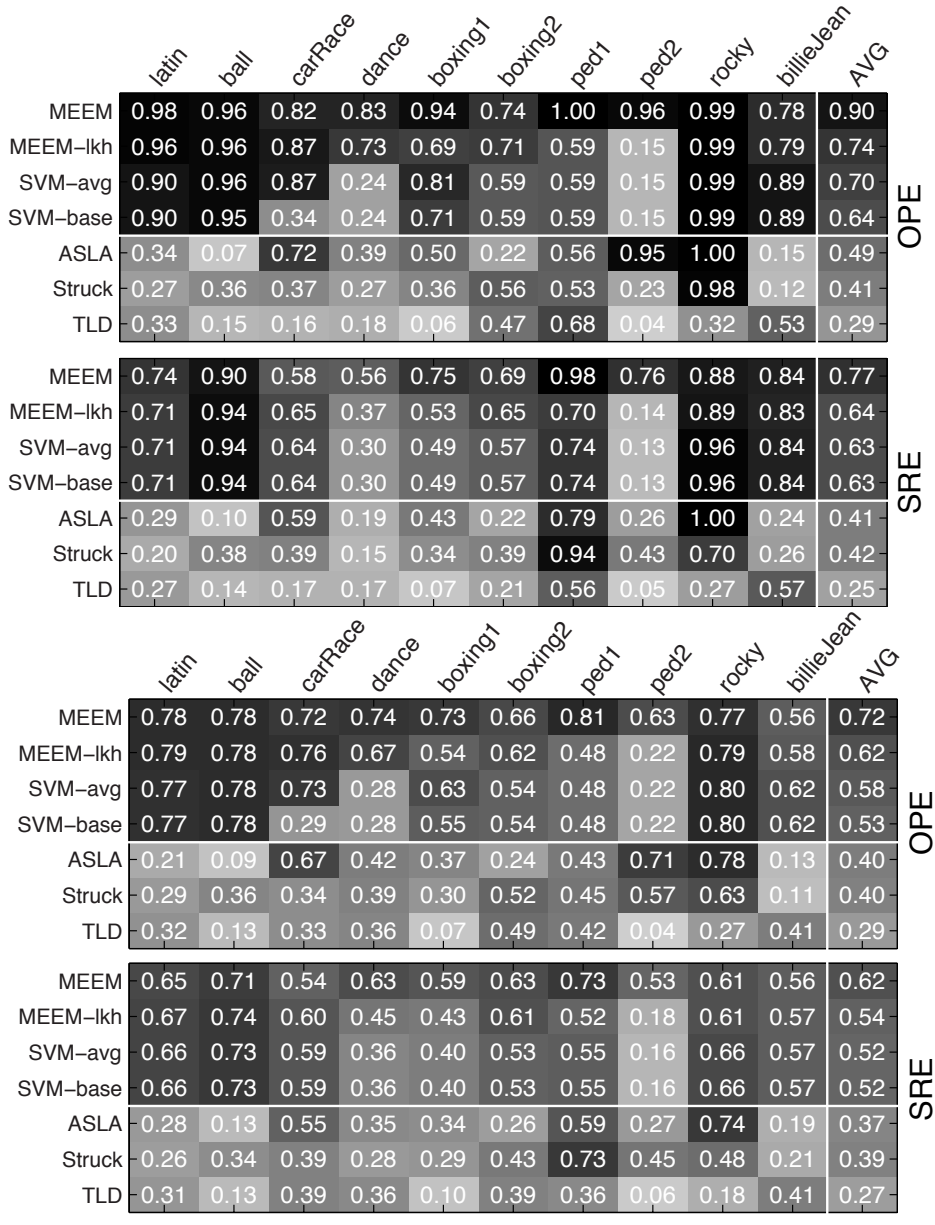

Fig. 7. Precision plot ranking scores (top) and AUC ranking scores (bottom) of MEEM, MEEM-lkh, SVM-avg, SVM-base and other state-of-the-art trackers on our newly collected sequences in Experiment II.