Fast and Robust Hand Tracking Using Detection-Guided Optimization

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1. Additional Qualitative Results

We show additional qualitative results in the supplementary video and Figure 1.

2. Hand Part Classification

We use 12 part labels for the hand (see Figure 1 in main paper) and found this to be an ideal tradeoff between classification accuracy and sufficient evidence for detection-guided optimization. We adopt the same depth features as [2]. Importantly, we use 50,000 labeled training images spanning the hand pose space, obtained from **real** hand tracking (using the depth-only version of our method), as opposed to synthetic data in previous work [1]. During training we trained 3 trees, each with a maximum depth of 22. For each training image, we sampled 2000 random, foreground pixels, and evaluated 4000 candidate threshold-feature response pairs.

The training was run on a 40-core machine with 80 GB of RAM. The training of the trees was run in parallel and took 38 hours in total. Preliminary cross-validation results on the disjoint partitions used for each tree show per-pixel classification accuracy of between 50-60%.

References

[1] C. Keskin, F. Kirac, Y. Kara, and L. Akarun. Real time hand pose estimation using depth sensors. In *Proc. of ICCV Workshops 2011*, pages 1228–1234. 1

[2] J. Shotton, A. Fitzgibbon, M. Cook, T. Sharp, M. Finocchio, R. Moore, A. Kipman, and A. Blake. Real-time human pose recognition in parts from single depth images. In *Proc. of CVPR 2011*, pages 1297–1304. 1

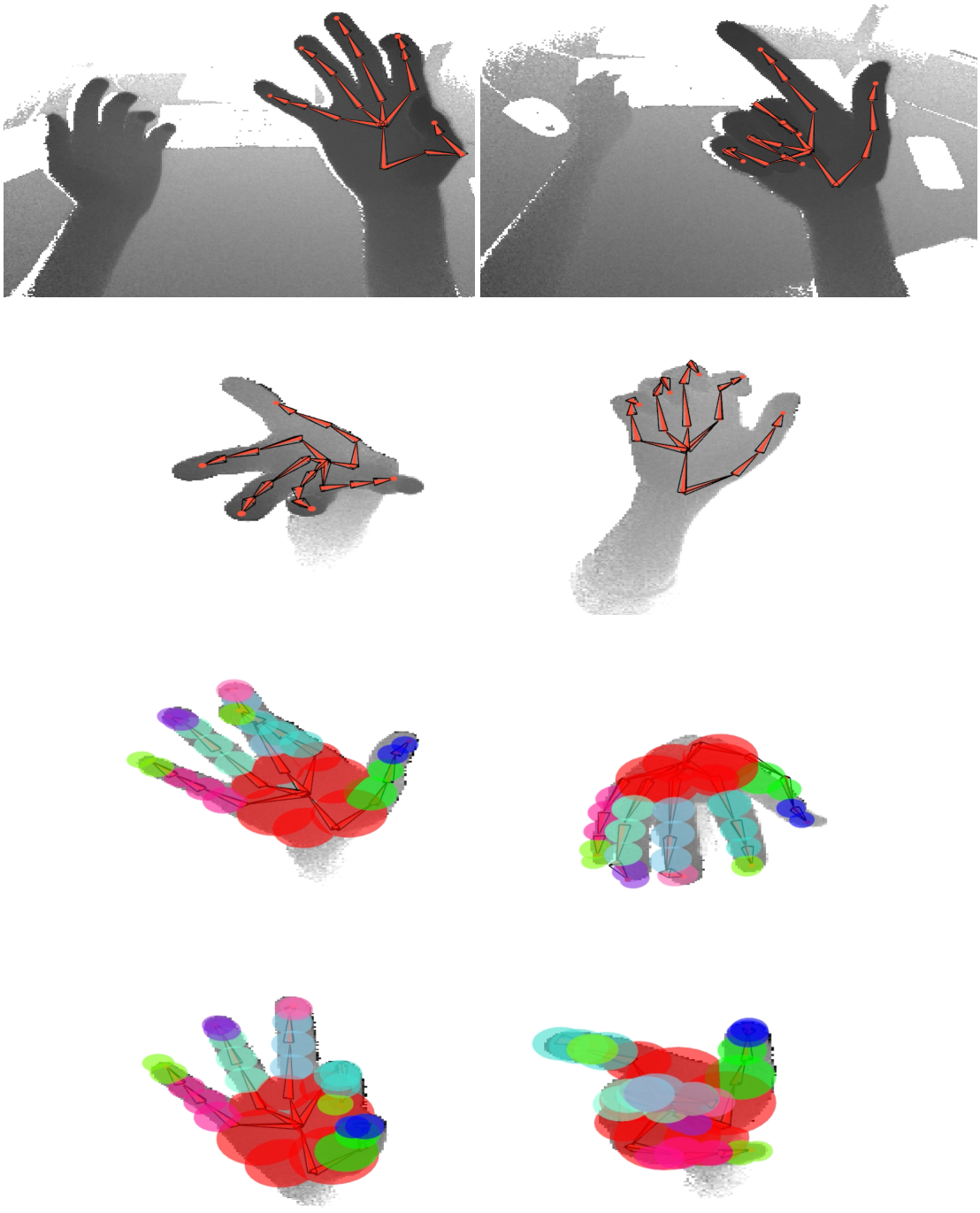

Figure 1. Qualitative tracking results. **Row 1**: Our method supports egocentric hand tracking of gestures like pointing and grasping. **Row 2**: Desktop tracking results. **Row 3, 4**: More tracking examples with 3D Gaussians overlaid.