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F O R S C H U N G S P R A X I S

Training for hand pose estimation with augmented dataset

Problem description:

Hand pose estimation plays an important role in some human-robot interaction tasks, such as gesture recognition and learning grasping capability by human demonstration. Since emergence of consumer-level depth sensing device, a lot of depth image based hand pose estimation methods appeared. For learning based methods, a large dataset for training is required to obtain good performance [1, 4]. Existing hand pose datasets usually only contain clean hand images, where the hand is not in contact with other objects [3, 2]. This constrains the trained models to be applied on hand-object interaction scenarios. To overcome this issue, a hand pose dataset that contains a lot of occlusion cases, is needed, because occlusion often appears during hand-object interaction. In this Forschungspraxis, the student will add artificial occlusion to existing dataset [3], in order to simulate hand-object interaction cases. The student will then use the augmented dataset to train a neural network following [1], and test the performance in real hand-object interaction scenario.

Work schedule:

- Literature review on hand pose estimation.
- Create augmented dataset.
- Training using augmented dataset.
- Test performance on real captured data.

Bibliography:

- [1] Markus Oberweger, Paul Wohlhart, and Vincent Lepetit. Hands deep in deep learning for hand pose estimation. *arXiv preprint arXiv:1502.06807*, 2015.
- [2] Danhang Tang, Hyung Chang, Alykhan Tejani, and Tae-Kyun Kim. Latent regression forest: Structured estimation of 3d hand poses. *Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*.
- [3] Jonathan Tompson, Murphy Stein, Yann Lecun, and Ken Perlin.
- [4] Xingyi Zhou, Qingfu Wan, Wei Zhang, Xiangyang Xue, and Yichen Wei. Model-based deep hand pose estimation.

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