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MASTER'S THESIS
for
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Hand segmentation using random forest on RGB-D data

Problem description:

This project aims to segment human hand from an RGB-D image in a hand-object interaction scenario. One approach for hand segmentation is using random forest classifier [1]. In previous random forest based methods, RGB alone based classifier [3] and depth alone based classifier [2] have been proposed. However, limitation of both RGB alone method and depth alone method exist. E.g. it is hard to distinguish skin colored background with human hand using RGB alone method. And by using depth alone, valuable color information is lost. To the best of our knowledge, there exist no RGB and depth combined classifier for human hand segmentation task. Perhaps one of the reason is that the ground-truth data is not available for RGB-D data. In this project, we aim to train an RGB-D combined classifier for hand segmentation task, especially focused on hand-object interaction scenarios.

Tasks:

- Literature study about hand segmentation methods using random forest.
- Collect ground truth data for hand segmentation.
- Implement the training framework for random forest method.
- Evaluation of segmentation accuracy using different low-level features for both RGB and depth data.

Bibliography:

- [1] Antonio Criminisi and Jamie Shotton. *Decision forests for computer vision and medical image analysis*. Springer Science & Business Media, 2013.
- [2] Byeongkeun Kang, Kar-Han Tan, Hung-Shuo Tai, Daniel Tretter, and Truong Q Nguyen. Hand segmentation for hand-object interaction from depth map. *arXiv preprint arXiv:1603.02345*, 2016.
- [3] Cheng Li and Kris Kitani. Pixel-level hand detection in ego-centric videos. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 3570–3577, 2013.

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