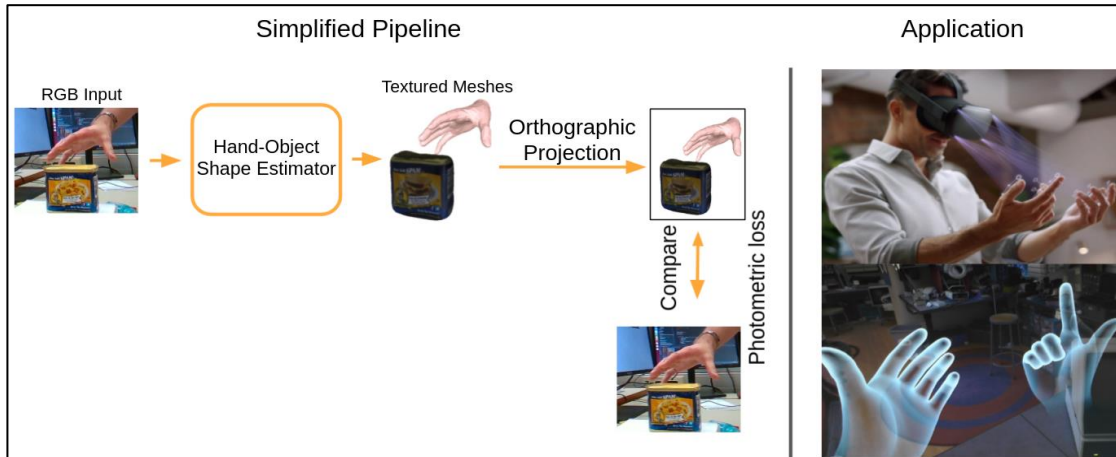


Master Thesis: Self-supervised Hand-Object reconstruction for VR/AR Application



Our hands are the main tool that we use for interaction with objects in the real world. Thus, hand-object reconstruction from a monocular image is a very important computer vision problem. Accurately estimating hand-object meshes and poses is crucial for many practical applications including virtual and augmented reality (VR/AR), human-computer interaction, fine-grained action recognition, imitation-based learning, and telepresence. Moreover, understanding hand-object interactions are essential for developing robots that perceive and act in the world. Recently, a plethora of studies focused on hand pose estimation. In consequence, impressive hand pose estimation results have been achieved. On the other hand, only a limited number of studies targeted the hand-object reconstruction problem such as [2]. In this project, we will develop a novel Hand-object Reconstruction algorithm which exploit the Self-supervision concepts. More details can be given in a personal meeting.

Although, we highly appreciate creative ideas, the initial plan of the thesis includes the following tasks:

1. Preparation and pre-processing of the InterHand2.6M hands dataset.
2. Running the state-of-the-art graph convolutions based open-source method [2] on InterHand2.6M dataset.
3. Understanding and running the pipeline of an open-source method [1] to understand texture-based hand model.
4. Design and implementation of a new self-supervised network architecture to estimate the texture of the estimated hand meshes.
5. Testing the model and iterative improvement of the architecture.

References:

- 1) Qian, Neng, Jiayi Wang, Franziska Mueller, Florian Bernard, Vladislav Golyanik and C. Theobalt. "HTML: A Parametric Hand Texture Model for 3D Hand Reconstruction and Personalization." ECCV (2020).
- 2) Bardia Doosti and Shujon Naha and Majid Mirbageri and David Crandall, "HOPE-Net: A Graph-based Model for Hand-Object Pose Estimation", CVPR 2020.

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