TECHNISCHE UNIVERSITÄT MÜNCHEN
Human-centered Assistive Robotics
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M A S T E R ' S T H E S I S
for
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Supervised Approaches for Human Pose Estimation from 3D Point Clouds

Problem description:

Human Pose Estimation is of vital importance for tracking human subjects in public surveillance applications or for establishing human safety in robotic environments. A plethora of work has been devoted to human pose estimation from RGB images, depth sensors and a combination of both. Thereby, the methods can be primarily grouped into sparse skeleton-based [2][3] and lately also dense approaches [1], the latter trying to establish correspondences between pixels in 2D images and 3D points on a human surface model. In this project, the ultimate goal is to identify human pose from 3D point clouds rather than 2D data, and to establish a mapping of these points to a 3D canonical human surface model. Therefore, State-of-the-Art (SOTA) methods first have to be examined and potentially transfered to the domain of 3D data. Moreover, for dense correspondence estimation among 3D points, labeled training data is not readily available. Existing 2D↔3D correspondence methods [1] can potentially be leveraged to create such a ground-truth, which is also subject to investigation.

Tasks:

- Literature review on Human Pose Estimation and search for a suitable dataset
- Setup of the development environment and reproducing suitable state-of-the-art on RGB/RGB-D data
- Adapting and exploring the applicability of SOTA methods for 3D point clouds
- Wrap-Up

Bibliography:

[1] R. A. Güler, N. Neverova, and I. Kokkinos. Densepose: Dense human pose estimation in the wild. *arXiv preprint arXiv:1802.00434*, 2018.
[2] D. Mehta, S. Sridhar, O. Sotnychenko, H. Rhodin, M. Shafiei, H.-P. Seidel, W. Xu, D. Casas, and C. Theobalt. Vnect: Real-time 3d human pose estimation with a single rgb camera. *ACM Transactions on Graphics (TOG)*, 36(4):44, 2017.
[3] C. Zimmermann, T. Welschehold, C. Dornhege, W. Burgard, and T. Brox. 3d human pose estimation in rgbd images for robotic task learning. *arXiv preprint arXiv:1803.02622*, 2018.

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