Tianyu Luan

3D VISION

Shenzhen, China
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EDUCATIONAL BACKGROUNDS

2014 – 2017 Master of Engineering

Electronic and Communication Engineering, Tsinghua University, China, (QS Ranking: 15)

2009 – 2013 Bachelor of Natural Science

Applied Physics, University of Science and Technology of China, (QS Ranking: 93)

PROFILE

My area of interest is computer vision, especially 3D vision. In this field, I have nearly five years of study, work, and research experience, including school courses/internships (18 months), 3D vision engineers (22 months), and research assistants in 3D vision (16 months). Therefore, I am familiar with the current research/product status, key points, and main difficulties in this field in both academia and industry.

My future goal is to achieve influential scientific research results and apply the results to actual products in order to change people's lives.

SKILLS

Mathematics Courses: Calculus, Linear algebra, Probability theory, Game theory.

Computer/3D Vision Courses: Multi-view geometry, Deep Learning, Digital image processing.

Coding: familiar with C++, Python, and MATLAB.

Deep Learning Frameworks: familiar with PyTorch, TensorFlow.

WORKING & PROJECT EXPERIENCE

2019.7- Research Assistant,

Shenzhen Institutes of Advanced Technology, Chinese Academy of Science.

Parameterized human mesh reconstruction based on single-frame images.

We propose a new human body modeling framework based on parametric models. Our contribution is to use the 3D human pose estimation model as an assistant to solve the depth ambiguity of human body parameterized reconstruction. In addition, the geometry-based framework costs very little computational resources, and its implementation is quite simple. When using the latest human pose estimation results as input, our performance exceeds SOTA on multiple datasets. I was responsible for the whole research and independently completed most of the work, including framework and module design, implementation, and experiments. The paper has been accepted by AAAI-2021.

Video-based 3D human pose estimation.

We propose a human pose estimation network architecture based on graph convolution. This architecture could well model the dynamic correlation of various keypoints of the human body in videos, thereby improving 3D pose estimation performance. When this architecture only requires 4 frames of 2D pose as input, our performance exceeds the SOTA result, which uses more than 200 frames as input. My participation in this project includes the reproduction of baseline, data preparation, and part experimental verification. The paper has been submitted to IEEE Transaction on Image Processing (TIP).

Realistic detailed human model reconstruction.

We propose a network to reconstruct a real-world human body model (with

surface details, clothes, and textures) from a single image based on weakly-supervised learning. As shown in the current experimental results, we only need a small number of 3D scan models as regulations, and then train the network with a large number of 2D images in a self-supervised manner. Our approach can largely improve the performance of baseline and exceed SOTA. I am responsible for this research and independently completed most of the work, including algorithm design, data collection, the reproduction of the baseline, algorithm implementation, and experiments. We plan to contribute this work to the next computer vision top conference.

2017.6-2019.4 Multi-media Algorithm Engineer,

Huawei Technologies Co., Ltd

Surface & texture reconstruction of human faces based on RGB-D video sequence.

In this project, our group built human face surface by fusing the depth images using Truncated Signed Distance Function (TSDF). The poses needed in the fusion were generated from point cloud registration based on Iterative Closest Point (ICP). Besides that, we also used affine transform to build texture for the surface. The color difference between different texture patches was compensated using second-order optimization. My contribution to this project covers algorithm research, data collecting, code implementation, and testing. In addition, I was in charge of the algorithms in the texture module. Most of my work focused on algorithm research and engineering implementation. This project had been successfully supported a demo show at one of Huawei's mobile phone press conference.

Real-time feature detection used in SLAM system.

We proposed an advanced feature extractor that supports Huawei AR Engine Simultaneous Localization & Mapping (SLAM) system. The proposed extractor has a very similar quality and robustness on weak texture (i.e., white walls, tiles) compared with Scale-invariant feature transform (SIFT), the SOTA approach, with the needs of much less computational resource. Our algorithm managed to run in real-time on a single core of an ARM.

PUBLICATIONS

[1] Luan, T., Wang, Y., Zhang, J., Wang, Z., Zhou, Z., Qiao, Y., (2021). PC-HMR: Pose Calibration for 3D Human Mesh Recovery from 2D Images-Videos. Accepted by AAAI 2021.

[2] Zhang, J., Wang, Y., Zhou, Z., Luan, T., Wang, Z., Qiao, Y., (2021). Dynamical Graph Network for 3D Pose Estimation in Videos. Submitted to TIP.

[3] Luan, Tianyu, and Keyuan Qian. "Research on influencing factors of LED frequency response." AIP Conference Proceedings. Vol. 1864. No. 1. AIP Publishing LLC, 2017.