Shaowei Liu

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Education

UC San Diego — **San Diego, USA**
M.S. in Computer Science, ***GPA: 4.0/4.0*** — *Sep. 2019 – Present*

Tsinghua University — **Beijing, China**
B.S. in Electronic Engineering, ***GPA: 3.69/4.0*** — *Aug. 2015 – July. 2019*

Research Interests

My research interests lie in applying computer vision and machine learning to model the physical world and interact with it. In particular, I am interested in hand-object interaction, affordance reasoning, and imitation learning. I would like to develop models using limited supervision and interacting with the environment.

Publications

Semi-Supervised 3D Hand-Object Poses Estimation with Interactions in Time
- **Shaowei Liu***, Hanwen Jiang* (equal contribution), Jiarui Xu, Sifei Liu, Xiaolong Wang
- CVPR 2021 Submission

Hand-Object Contact Consistency Reasoning for Human Grasps Generation
- Hanwen Jiang*, **Shaowei Liu*** (equal contribution), Jiashun Wang, Xiaolong Wang
- CVPR 2021 Submission

Light and Fast Hand Pose Estimation From Spatial-Decomposed Latent Heatmap
- **Shaowei Liu**, Guijin Wang, Pengwei Xie, Cairong Zhang
- IEEE Access 2020

Research Experience

Semi-Supervised Hand-Object Pose Estimation — **CSE Department, UCSD**
Advised by Prof. Xiaolong Wang — *Feb. 2020 – Present*
- Build a joint learning framework for estimating hand meshes and object poses simultaneously.
- Design a contextual reasoning module between hand and object representations.
- Leverage the spatial-temporal consistency in large-scale hand-object videos as a constraint to generate pseudo labels used for semi-supervised learning

Natural Human Grasps Generation — **CSE Department, UCSD**
Advised by Prof. Xiaolong Wang — *Feb. 2020 – Present*
- Proposed a Conditional Variational Auto-Encoder for coarse human grasps generation and a ContactNet for fine-tuning.
- Designed two novel objectives in training to encourage the prior hand contact points to be

close to the object surface and the object common contact regions to be touched by the hand at the same time.
- Formulated a new self-supervised task which allowed the grasp generation to be adapted during test time.

Depth-based 3D Hand Pose Estimation **Visual Computing Lab, Tsinghua**
Advised by Prof. Guijin Wang *Dec. 2018 – May. 2019*

- Presented a light and efficient approach for fast and accurate hand pose estimation from a single depth image.
- Decomposed 3D joint regression into 2D plane localization and 1D axis estimation from different spatial perspectives.
- Designed multiple latent heatmap regression branches to predict hand pose separately and a fusion network to output the final result.

Binocular Fingertip Estimation **Visual Computing Lab, Tsinghua**
Advised by Prof. Guijin Wang *Sep. 2017 – June. 2018*

- Used Leap Motion, an interactive equipment, to collect finger binocular images.
- Applied deep learning techniques in near-field estimation to predict disparity between right and left images.
- Calculated 3D position of fingertips according to camera intrinsic and binocular cue using stereo vision.

Internship

Noah's Ark Lab **Beijing, China**
Advised by Dr. Bailan Feng *July. 2018 – Oct. 2018*

- Researched in blind face image quality assessment.
- Combined statistical approaches and deep learning approaches flexibly and conducted one-class classification in the deep feature space of input human faces.
- Successfully solved the problem of automatic face image quality assessment.

Baidu Institute of Deep Learning **Beijing, China**
Advised by Ming Sun *July. 2017 – Sep. 2017*

- Established a high efficient and accurate processing pipeline for fine-grained flower image classification.
- Proposed an improved version of softmax loss thus enabled to make use of false recognized samples to achieve better training.
- Raised the accuracy of top-3 from 59% to 61%, and that of top-5 from 75% to 78%, while ensured the recall rate at 90%.

Award

Outstanding Undergraduate Thesis (top 5%), Tsinghua University. 2019

Academic Service

Reviewer for IEEE Access

English Proficiency

TOEFL (IBT): Reading 29/30, Listening 25/30, Speaking 27/30, Writing 28/30

GRE: Verbal 157/170, Quantitative 167/170, Analytical Writing 4.0/6.0

Skills

Programming Language: Python, C++, Java, MATLAB, Go, Cuda, Bash, Latex, SQL, HTML/CSS, JavaScript, Verilog, Assembly language

Hardware: FPGA, Modelsim, Multisim, Vivado, Jetson Nano, and Single-chip Development

Software: Git, Docker, OpenMP, Kubernetes, Opencv, Weka, Scikit-Learn, PyTorch, Caffe, TensorFlow