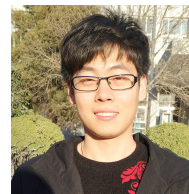# YONGJIE ZHU

Beijing, China · yongjie.zhu.96@gmail.com · (+86) 13269033866

EDUCATION

Beijing University of Posts and Telecommunications *GPA: 3.8* — Beijing, China
Bachelor   Communication Engineering — Sep 2015 - Jun 2019

Beijing University of Posts and Telecommunications — Beijing, China
Master candidate   Artificial Intelligence — Sep 2019 - Present

EXPERIENCE

Youtu X-Lab, Tencent | Intern — Shenzhen, China
Research Area: computer vision — July 2018 - Apr 2019

During my internship at Tencent, I completed a physically-based 3D face modeling research under the joint guidance of Dr. Chen Li, Senior Researcher at Tencent, and Prof. Boxin Shi at Peking University. We propose a hybrid reflection model of face reflectance and illumination and solve the monocular face reconstruction problem with a self-supervised deep learning method. This method was submitted to TPAMI (first author).

Camera Intelligence Research Group, PKU (PKU-CI) | Intern — Beijing, China
Research Area: computational photography — May 2019 - Present

At PKU-CI, my research topic is photometric image model in low-level vision. Under the guidance of Prof. Shi, I completed the intrinsic image decomposition method in the outdoor scene and further separated the shadow part caused by occlusion from the image. This work was submitted to ICCP 2021 (first author). Also, I built a large-scale HDR panorama image dataset for city scenes, based on which I proposed the first spatially-varying outdoor estimation method using a single limited-FOV image. This work was submitted to CVPR 2021 (first author).

PUBLICATIONS

[1]. Yongjie Zhu, Chen Li, Si Li, Boxin Shi, and Yu-Wing Tai. Hybrid Face Reflectance, Illumination, and Shape from a Single Image | TPAMI 2021

[2]. Yongjie Zhu, Jiajun Tang, Si Li and Boxin Shi. DeRenderNet: Intrinsic Image Decomposition with Shape-(In)dependent Shading Rendering | ICCP 2021

[3]. Yongjie Zhu, Yinda Zhang, Si Li and Boxin Shi. Spatially-Varying Outdoor Lighting Estimation from Intrinsics | CVPR 2021 (Oral)

PROJECTS

Shape from Shading (Optimization Algorithm | Tencent Research Project) *C++, Eigen, L-BFGS*

An optimization algorithm that estimates albedo, normal, and lighting from a single RGB image. Given a single face image, our algorithm uses 3DMM fitting to obtain the initial normal which contains only low-frequency information, and then recovers high-frequency information according to the "shape from shading" theory.

**3D Face Reconstruction (Deep Learning | Tencent Research Project)** *Pytorch*
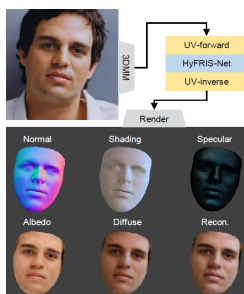
A self-supervised deep learning framework that can estimate the hybrid reflection model and detailed normal of the human face. The proposed hybrid reflectance and illumination representation ensures the photo-realistic face reconstruction.

Intrinsic Image Decompositon (Deep Learning | CIRG Research Project) *Pytorch*

A deep learning method that decomposes the intrinsic components of outdoor scenes. This method can decompose a single RGB image into reflectance, shading (caused by direct lighting), and shadows (caused by occlusion). Compared with traditional methods, our method can further separate the shadow part from the shading image and obtain the intrinsic reflectance closer to the real situation.

Biophysical Skin Model of Human Face (Deep Learning | PKU-CI and Huawei Japan Joint Research Project) *Pytorch*
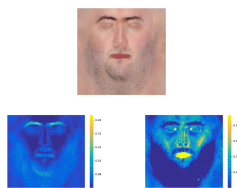
A biophysical skin model is applied to inverse rendering of facial appearance. By exploring the biophysical constraint with a multi-layer skin model (oil layer + melanin layer + hemoglobin layer), we completed the forward face appearance modeling with biophysical skin support and trained a deep learning model to estimate biological skin parameters.

Spatially-Varying Outdoor Lighting Estimation (Deep Learning | PKU-CI Research Project) *Pytorch*

A dataset and lighting estimation method that deals with spatially-varying outdoor illumination. This dataset was obtained by locally putting virtual light probes in an HDR environment of large-scale virtual city scenes built in Blender. Besides, we proposed a complete outdoor spatially-varying lighting estimation scheme and proved its effectiveness through experiments.

Skills

C++:	Eigen, L-BFGS, OpenCV, OpenGL, CMake
Python:	Pytorch, Numpy, OpenCV, Blender Script, ...
Matlab:	Matrix Operations

Awards

School scholarship BUPT
First class award (top 10%) 2016, 2017, 2019, 2020

Enterprise scholarship BUPT
JJWorld (Beijing) Network Technology Scholarship(top 3%) 2018

Research Interest

At present, I focus on the research of photometric methods for computer vision, including intrinsic image decomposition, physically-based 3D face modeling, inverse rendering, lighting estimation, etc.