Shuai Chen

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EDUCATION

DPhil in Engineering Science (3D Computer Vision @ Active Vision Lab) — Sep 2020-2024
University of Oxford, Oxford

M.S in Electrical Engineering — May 2016
University of Southern California, Los Angeles, CA — GPA 3.89/4.0

B.S in Electrical Engineering — May 2015
University of Southern California Los Angeles, CA — Major GPA 3.80/4.0, Cumulative GPA 3.64/4.0

RESEARCH INTERESTS

Computer Vision/Machine Learning. 4 years of industry experience developing AI algorithms for real-time mobile platforms and embedded systems, including image super-resolution, semantic segmentation, object classification, video stabilization, video denoising, GANs, etc. My recent interest is in camera relocalization and neural rendering.

PUBLICATIONS

[1] **S Chen**, Z Wang, V A Prisacariu. Direct-PoseNet: Absolute Pose Regression with Photometric Consistency. International Conference on 3D Vision (*3DV*), 2021

[2] C Li, L Song, **S Chen**, R Xie, W Zhang. Deep Online Video Stabilization using IMU Sensors. IEEE Transactions on Multimedia (*TMM*), 2022

[3] **S Chen**, X Li, Z Wang, V A Prisacariu. DFNet: Enhance Absolute Pose Regression with Direct Feature Matching. European Conference on Computer Vision (*ECCV*), 2022

[4] **S Chen**, Y Bhalgat, X Li, J Bian, K Li, Z Wang, V A Prisacariu. Refinement for Absolute Pose Regression with Neural Feature Synthesis. ArXiv, 2023

ACADEMIC SERVICES

Reviewer – ECCV 2022, CVPR 2023, ICCV 2023

EMPLOYMENT

- **Senior AI Algorithm Engineer (Team Leader),** *Huawei Technologies, China* **2018-Jul 2020**
- **AI Algorithm Engineer,** *Huawei Technologies, China* **Jan 2017-2018**

AI Video Stabilization **Feb 2018- Jul 2020**

- Developed a real-time AI-based video stabilization algorithm, including adaptive rolling shutter correction, focus breathing reduction, trajectory smoothing, etc., as a major developer and team leader
- Implemented neural networks in TensorFlow and video stabilization pipeline code in C++. The algorithm features **ML motion filtering,** which yields **superior performance** compared to traditional methods.
- Designed a **novel hyper-parameter optimization method** using AutoML for video stabilization.
- Delivered a face-centric video stabilization algorithm using face landmarks and IMU for front-camera videography.
- This project produced **Top-selling features** for numerous Huawei's flagship smartphones and achieved **No.1 scores on the DxOMark in 2019 and 2020**.

Two-stage Video Stabilization **Feb 2020- Jul 2020**

- Developed an industry-first 2-stage EIS method co-designed with novel ISP. Reduced up to 30%+ memory and power consumption while **surpassing previous SOTA performance** in dynamic environments.

- Implemented trajectory prediction & scene classification multitasking neural nets with AutoML enhancement. Proposed theoretical improvements on dynamic crop boundary constraints.

5D Video Stabilization **Feb 2020- Jul 2020**

- Developed a real-time visual-inertial based video stabilization method. The solution uses sparse feature detection and projection, 5D rolling shutter correction, and joint optimization on 3D rotiation and 2D translation.

5D Video Temporal Noise Reduction **Feb 2018-May 2020**

- Developed a real-time video noise reduction algorithm by leveraging multi-frame and IMU. **Achieved No.1 on the DxOMark** in front camera 4K video de-noising.
- Delivered as a **top-selling feature for low-light videography** on Huawei flagship P40 series.

Face Attribute & Facial Landmark Detection **Feb 2018-Apr 2019**

- Supervised 40+ real-time on-device face attribute classification algorithms as a team leader. The method **surpassed the 2018 SOTA papers' results by a large margin** in many attributes, such as gender & age. Engineered optimal solutions for face detector + face attributes models. Developed TensorFlow baseline framework code for the team.
- Supervised facial landmark detection algorithm as a team leader. The algorithm **delivers superior performance and faster inference time** than competing products while innovatively added face occlusion detection with high accuracy.

Multi-frame Super-resolution/Camera Zoom **Sep 2017-Feb 2018**

- Implemented a real-time super-resolution algorithm based on multi-frame convolutional neural networks & knowledge distillation as a major developer
- The SR algorithm combines super-resolution, de-nosing, and sharpening tasks and successfully achieves commercial-level performance.
- The project became a part of **top selling features** on Huawei flagship phones P20 series and **obtained No.1 score on DxOMark** mobile camera zoom evaluation.
- Implemented Face SR algorithm using GAN and proposed a new discrimination loss for different face components

Single-frame Super-resolution/Camera Zoom **Jan 2017-Sep 2017**

- Developed an **industry-first deep learning-based SR algorithm for Mobile Camera Zoom** as a major developer in algorithm design, model training, and camera zoom pipeline integration. This technology became one of **the top-selling features** on Huawei flagship phones Mate10 series & Honor V10.
- Implemented baseline SR algorithm **achieved 0.7dB PSNR better than 2016 state-of-art solution VDSR**.
- Reduced the SR network to meet real-time on device. The model **achieved 0.7dB PSNR better than FSRCNN** while significantly faster in inference time.

Image Semantic Segmentation/Selfie Portrait Segmentation **Jan 2017-May 2017**

- Implemented part of CNN-based portrait segmentation network in C++ and network quantization in Python.
- Delivered as a **top-selling feature** on Huawei flagship phones/tablets for portrait segmentation in Selfie Mode.

- **Software Verification Engineer,** *Huawei Technologies, China* **Aug 2016-Dec 2016**

- Developed Android Boot automation testing environment in Python, which was used across all product lines of Huawei mobile phones.

- **Engineer Intern,** *CITIC Pacific Mining in Perth, Australia* **Jul 2012-Aug 2012**
- **Engineer Intern,** *Motorola Mobility in Tianjin TEDA, China* **May 2012-Jul 2012**

PATENTS

- US Patent 20,200,334,789: Image Processing Method and Device
- US Patent 20,220,180,485: Image Processing Method and Electronic Device
- WO Patent WO/2021/013,139: Image Processing Method and Device

- WO Patent WO/2022/206,605: Method for Determining Target Object, and Photographing Method and Device
- WO Patent WO/2022/121796: Image Processing Method and Electronic Device
- CN Patent 113,572,948: Video Processing Method and Video Processing Device
- CN Patent 113,660,408: Video Shooting Anti-shake Method, Device

INVITED TALKS

- Invited Talk at Huawei Future AI Camera ISP Workshop. May 2020
- Invited Host at Huawei Global AI Workshop - Day 1. January 2019
- Invited Talk at Huawei Executive Management Team. May 9, 2018.
- Invited Talk at Huawei Beijing Research Center Annual Conference. January 27, 2018.

HONORS

- Huawei UK Ph.D. Fellowship, 2021-2023
- Fast-track Promotion Plan for Outstanding Employees, Huawei Technologies 2017-2020
- CBG Hero Medal Award, Huawei Technologies, 2019
- Handset Product Line President Award of 2018, Huawei Technologies, 2019
- 2nd Prize Winner 2018 Huawei Beijing Research Center AI Hackathon, Huawei Technologies, 2018
- Top-10 Distinguished Engineer of the Year, Huawei Beijing Research Center, 2017
- Distinguished New Employee Award, Huawei Technologies, 2017
- Grand Final 2016 Hackathon, Huawei Beijing Research Center, 2016
- Alpha Lambda Delta National Honor Society, University of Southern California