Weichen Zhang

AI Researcher & AI Engineer | Ph.D.

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I am a **highly motivated** Machine Learning and Deep Learning Researcher and Engineer, currently serving as a **Postdoctoral Researcher** at the University of Sydney. Previously, I **led the R&D team** at Bodymapp Pty Ltd and played a key role in building, managing and optimizing AI algorithms, DevOps and **AWS MLOps** pipelines. My expertise lies in advancing the performance of **large-scale 3D Point Cloud analysis**, **3D mesh reconstruction**, **SLAM**, and **neural network segmentation** models. The developed patent-protected cloud-based deep learning avatar reconstruction application consistently generated substantial revenue. In addition, as a Ph.D. graduated from the University of Sydney, my research focused on **deep visual transfer learning**. I also specialize in designing and improving deep learning algorithms for both 2D and 3D visual applications, employing both **supervised** and **unsupervised** approaches. My research contributions are reflected in publications at top-tier AI conferences and journals, including **CVPR**, **T-PAMI**, and **T-IP**, etc. Currently, my research interests encompass **2D/3D visual applications**, **human body reconstruction and tracking**, as well as **model generalization**. With a rich portfolio of **multisensor** and **multidomain** research endeavors, I strive to deepen my expertise and contribute to the advancement of **practical and impactful visual applications**.

Career Highlights :

- **8+ years** of **AI and DL/ML research experience** in 2D/3D Image/Video/PointCloud multi-modal multi-domain supervised/unsupervised visual application processing (recognition, detection, segmentation, etc.) system design.
- **3+ years** of **industry R&D experience** at Bodymapp focusing on AWS MLOps pipeline design, 3D reconstruction, neural networks, measurement and recommendation system.
- **1 year** of **technical leading experience** at Bodymapp, including method ideation and implementation, arranging meetings, brainstorming, retrospective and managing task priority.
- **1 year** of **tutoring and teaching experience** at The University of Sydney, focusing on deep neural networks and transfer learning. Introducing transfer leaning and domain adaptation and Designing assignments.

Skill

Programming :	**Python**, **Matlab**, **bash**, **C++**, Java, C, C#.
ML Libraries :	**PyTorch**, **Numpy**, **Open3D**, **OpenCV**, **Scikit-Learn**, Caffe, Tensorflow, .NET Framework.
Development Tools :	**Visual Studio Code**, **Sublime**, **Atlassian/Git**, Google/Microsoft Office, OmniGraffle, Blender.
Data Processing :	**RGB/Depth image/video**, **3D mesh**, **3D point clouds(Lidar)**, Text, Audio-Sequences.
Tasks :	**3D Reconstruction**, **SLAM**, **De-noising**, **Recognition**, **Localization**, **Regression**, **Segmentation**, **Distortion Correction**, **Landmark Detection**, **Evaluation Metrics**, Audio processing.
Database :	PostgreSQL, MySQL, Firebase.
Others :	**CI/CD**, **DevOps**, **AWS MLOps**, CSS, jQuery, XML, HTML.

Experience

Current – Sep 2024 — University of Sydney (ACFR) - Postdoctoral Research Associate

- Research and develop 3D Point Cloud Regression, Segmentation and Reconstruction of large-scale forestry data using advanced techniques, e.g. PC Transformer and Sparse CNN. Create novel unified 3D forest PC regression model to predict analytical parameters for individual trees and forest plots.
- Collaboration with New Zealand SCION research institute. Design and plan research directions and targets for forestry benefits.

Python | PyTorch | Meshlab

Aug 2024 – May 2021 — Bodymapp - Research Engineer & RnD Team Lead

- Analyze and summarize team work progress, share, prioritize, evaluate and implement both Algorithm and DevOps ideas.
- Correct Depth Camera Lens Distortion using combinations of ML and DL methods. (python)
- Implement 3D Human Mesh Reconstruction model from depth videos using combinations of ML and DL methods. (python & Matlab)
- Build AWS ML back-end pipeline for mobile application. (bash, python, AWS s3, ec2, terraform, etc.)
- Optimize 3D Human Modal measurement system. (C++)
- Build and maintain annotation platform (label studio) for the continuous improvements of neural net models. (python & XML)
- Help monitor and maintain the algorithm reliability of the production pipeline. (AWS & plug-ins)

Python | PyTorch | Matlab | C++ | Docker | AWS | Jenkins | Bash | XML

December 2019 – July 2019 | University of Sydney - Academic Tutor (ELEC5307 Advanced Signal Processing with Deep Learning)

- Teach Python programming language and methods for deep learning.
- Introduce Transfer Learning and Domain Adaptation.
- Design assignments : 1. Organize students to collect fruit data and conduct fruit image classification challenges with deep CNN. Organize students to collect office supply data and conduct transfer learning office supply image classification tasks using domain adaptation techniques.

Python | PyTorch | Microsoft Office

Education

2017-2021 Doctor of Philosophy (**Ph.D.**), Deep Transfer Learning, University of Sydney, Australia

2013-2016 Bachelor of Information Technology (**BIT, Honours Class I**), University of Sydney, Australia

2009-2012 High School Affiliated to Nanjing Normal University, China

Projects and Publications

1) **3D mesh reconstruction (Bodymapp).** Zero-to-One World-Class depth-only (protect privacy) mobile App for accurate scanning, reconstructing, and measuring the human body on various iOS devices (iPhones/iPads).
   - **[US Patent]** : **Zhang, W.**, et al. (if applicable). "Methods for generating a partial three-dimensional representation of a person."(in submission)
2) **Cross-domain 3D object detection.** Pioneering 3D point cloud based Cross-environment Object Detection in Autonomous Driving Scenarios.
   - **[CVPR 21]** : **Zhang, W.**, Zhang, W., Li, W., & Xu, D. "SRDAN : Scale-aware and range-aware domain adaptation network for cross-dataset 3D object detection." *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, 2021.* (**CORE A*** Conference)
3) **Cross-domain Object recognition.** Collaborative and Adversarial Network for Unsupervised Domain Adaptation with pioneering use of adaptive pseudo labels and adversarial learning(GAN).
   - **[US Patent 21]** : **Zhang, W.**, et al. "Method for training deep neural network and apparatus." **U.S. Patent** Application No. 17/033,316.
   - **[CVPR 18]** : **Zhang, W.**, Ouyang, W., Li, W., & Xu, D. Collaborative and adversarial network for unsupervised domain adaptation. In Proceedings of *the IEEE Conference on Computer Vision and Pattern Recognition, 2018.* (**CORE A*** Conference)
4) **Cross-domain cross-modality recognition.** Self-paced Collaborative and Adversarial Network with mutual multi-modal adaptability.
   - **[T-PAMI 19]** : **Zhang, W.**, Xu, D., Ouyang, W., & Li, W. Self-paced collaborative and adversarial network for unsupervised domain adaptation. *IEEE Transactions on Pattern Analysis and Machine Intelligence.* doi : 10.1109/ TPAMI.2019.2962476. (**CORE A*** Journal)
5) **Cross-domain cross-modality recognition and detection.** Progressive Modality Cooperation for Multi-Modality Domain Adaptation with missing modality generative model.
   - **[T-IP 21]** : **Zhang, W.**, Xu, D., Ouyang, W. & Zhang, J. (2021). Progressive Modality Cooperation for Multi-Modality Domain Adaptation. *IEEE Transactions on Image Processing.* (**CORE A*** Journal)
6) **Cross-domain model compression.** Model Compression using Progressive Channel Pruning which is proven effective combining transfer learning.
   - **[T-CSVT 20]** : Guo, J., **Zhang, W.**, Ouyang, W., & Xu, D. (2020). Model Compression using Progressive Channel Pruning. *IEEE Transactions on Circuits and Systems for Video Technology.* doi : 10.1109/TCSVT.2020.2996231.(**IEEE** Journal)
7) **Cross-modality pose estimation.** 3D Hand Pose Estimation with Disentangled Cross-Modal Latent Space and modality generation.
   - **[WACV 20]** : Gu, J., Wang, Z., Ouyang, W., **Zhang, W.**, Li, J., & Zhuo, L. (2020). 3D Hand Pose Estimation with Disentangled Cross-Modal Latent Space. In *2020 IEEE Winter Conference on Applications of Computer Vision.* (**CORE A** Conference)

Awards

- **Research Training Scholarship(RTP)**, University of Sydney, Australia, 2017-2021
- **Norman I Price Scholarship**, University of Sydney, Australia, 2018-2019
- **CVPR2018 Paper Spotlight**, Salt Lake City, USA, 2018
- **USYD-CSIRO Summer Scholarship**, University of Sydney, Australia, 2016-2017