Songyao Jiang

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EDUCATION

Northeastern University — **Boston, MA**
Ph.D. in Computer Engineering — **06/2016 – 04/2022 (expected)**
- Advisor: Prof. Yun (Raymond) Fu
- Concentration: Computer Vision and Pattern Recognition, Machine Learning.

University of Michigan — **Ann Arbor, MI**
Master of Science in Electrical and Computer Engineering — **09/2013 – 06/2015**
- Coursework: Linear Algebra, Machine Learning, Image Processing, Database Management, Embedded System Programming, *etc*.

Hong Kong Polytechnic University — **Hong Kong**
Bachelor of Engineering in Electrical Engineering, — **09/2009 – 06/2013**
- Coursework: Programming, Computer Architecture, Operating Systems, Analog and Digital Circuits, *etc*.

RESEARCH INTERESTS

Computer Vision: Human Face and Gesture, Video Classifications, Human Detection and Pose Estimation, Generative Models, Adversarial Training, Skeleton-base Action Recognition, Sign Language Recognition.

RESEARCH EXPERIENCE

Northeastern University — **Boston, MA**
Graduate Research Assistant in SMILE Lab — **06/2016 – present**
- Advisor: Prof. Yun (Raymond) Fu
- Research topics: human detection, pose estimation, action recognition, sign language recognition, generative models, adversarial training.

Giaran, Inc. (acquired by Shiseido Americas) — **Boston, MA**
Founding Member and Research Engineer Intern. — **01/2017 – 09/2017**
- Developed key algorithms in the core products, including a real-time AI color calibration system, a virtual makeup addon, removal and recommendation system and a face detection and alignment using OpenCV/Caffe in C++ and JavaScript.
- Acquired by Shiseido Americas.

Northeastern University — **Boston, MA**
Research Assistant in Power Electronics Research Group — **09/2015 – 06/2016**
- Advisor: Prof. Bradley Lehman
- Research topic: Machine learning on photovoltaic power prediction.

Teld New Energy — **Qingdao, Shandong, China**
Research Engineer in Electric Vehicle Research Team — **05/2015 – 08/2015**
- Research topic: Grouped smart mass charging system for electric vehicles (EV).
- Developed a machine learning based smart charging algorithm for massively grouped EV charging system, which mitigated the charging load on power system, optimized the use of renewable energy resources in micro-grids, and improved the EV battery life.

Nagoya University — **Nagoya, Aichi, Japan**
Research Assistant in Suzuoki Lab — **05/2014 – 08/2014**
- Advisor: Prof. Takeyoshi Kato
- Research topic: mathematical modelling of renewable energy.

TEACHING EXPERIENCE

Northeastern University **Boston, MA**

Teaching Assistant for Course EECE-5642: Data Visualization **Spring 2018**

- Introduced relevant topics and concepts in visualization, including computer graphics, visual data representation, physical and human vision models, numerical representation of knowledge and concept, animation techniques, pattern analysis, and computational methods.

PUBLICATIONS

- B. Sun, Y. Zhang, **S. Jiang**, and Y. Fu, "Hybrid Pixel-Unshuffled Network for Lightweight Image Super-Resolution," *Under Review*, 2021.
- **S. Jiang**, B. Sun, L. Wang, Y. Bai, K. Li, and Y. Fu, "Sign Language Recognition via Skeleton-aware Multi-modal Ensemble," *Under Review*, 2021. [Preprint][GitHub]
- **S. Jiang**, B. Sun, L. Wang, Y. Bai, K. Li, and Y. Fu, "Skeleton Aware Multi-modal Sign Language Recognition," in *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2021. [Paper][GitHub]
- **S. Jiang**, Z. Tao, and Y. Fu, "Geometrically Editable Face Image Translation with Adversarial Networks," *IEEE Transactions on Image Processing (TIP)*, vol. 30, pp. *2771-2783*, 2021. [Paper]
- **S. Jiang**, H. Liu, Y. Wu, and Y. Fu, "Spatially Constrained GAN for Face and Fashion Synthesis," in *16th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2021. [Paper][GitHub][Award][Web]
- Y. Yin, J. P. Robinson, **S. Jiang**, and Y. Fu, "SuperFront: From Low-resolution to High-resolution Frontal Face Synthesis," in *Proceedings of ACM Multimedia (ACMMM)*, 2021. [Paper][GitHub]
- Y. Yin, **S. Jiang**, J. P. Robinson, and Y. Fu, "Dual-attention GAN for Large-pose Face Frontalization," in *15th IEEE International Conference on Automatic Face & Gesture Recognition (FG),* 2020. [Paper][GitHub]
- S. Sarkar, W. Kang, **S. Jiang**, K. Li, S. Ray, E. Luther, A. R. Ivanov, Y. Fu, and T. Konry, "Machine Learning-aided Quantification of Antibody-based Cancer Immunotherapy by Natural Killer Cells in Microfluidic Droplets," Lab on a Chip, 20(13), pp. *2317-2327*, 2020. [Paper]
- Z. Hong, T. Sun, **S. Jiang**, K. Li, Y. Fu, H. Xu, J. Zhang, Y. Liu, Q. Ye, and H. Cang, "Harnessing Deep Learning to Overcome Photo-toxicity for Live-cell Imaging," *Under Review*, 2020.
- **S. Jiang**, Z. Tao, and Y. Fu, "Segmentation Guided Image-to-Image Translation with Adversarial Networks," in *14th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2019. [Paper][GitHub]
- T. Alashkar, **S. Jiang**, and Y. Fu, "Rule-Based Facial Makeup Recommendation System," in *12th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2017. [Paper]
- T. Alashkar, **S. Jiang**, S. Wang, and Y. Fu, "Examples-Rules Guided Deep Neural Network for Makeup Recommendation," in *Proceedings of AAAI Conference on Artificial Intelligence (AAAI)*, 2017. [Paper]
- **S. Jiang** and T. Kato, "Dynamic Modelling of Combined Cycle Power Plant for Load Frequency Control with Large Penetration of Renewable Energy," in *7th JUACEP Workshop*. 2014.

OTHER RESEARCH PROJECTS

Northeastern University **Boston, MA**

Multi-modal and Multi-label Semantic Segmentation for Agriculture Vision **03/2021 – 06/2021**

- Developed a multi-model and multi-label self-constructing GCN for semantic segmentation networks using satellite RGB and infra-red agriculture images.
- Ranked 4th in the CVPR 2021 Challenge on Agri-Vision. [GitHub]

Light-weight and Video-based Multi-person 2D Pose Estimation with Tracking **02/2020 – 12/2020**

- Improved the accuracy of pose estimation and tracking by utilizing temporal information of the human body movement between adjacent video frames using a temporal-aware deep CNN based network, which refined the pose estimation results in video and real-time scenarios and handled difficult cases like occlusions.
- Deployed on mobile devices using CoreML (iOS) and TensorFlow Lite (Android).
- Won GapFund360 Award and filed two patent applications (status: published). [Patent1][Patent2]

Face Recognition and Verification in Low-light Condition Using Transfer Learning **05/2019 – 11/2019**

- In low-light condition, we utilized mid-range and long-range infra-red (IR) wavelengths to obtain the portrait images of the target persons for face recognition and verification.
- Developed a semi-supervised metric learning method and an unsupervised adversarial method to transfer the knowledge from visible spectrum to IR spectrum. Such approach achieved much higher accuracy.

Facial Attributes Classification, Makeup Recommendation and Addon Systems **02/2016 – 04/2016**

- Collected a facial attribute and makeup dataset (e.g., skin color, face and eye shapes). Developed a facial attribute classification system using pretrained deep features and multi-class SVM.
- The predicted classes of facial attributes were then used to recommend makeup styles for users using a learned knowledge-based system learned from YouTube makeup videos. A makeup add-on system is developed to virtually visualize the recommended makeup.
- Awarded NSF I-Corps Grant. Used in our startup company "Giaran, Inc." [Patent]

Machine-Learning Based Snow Effect and Photovoltaic Power Output Prediction **12/2015 – 03/2016**

- Predicted the snow effects on photovoltaic (PV) power output during winter when PV panels experienced snowfalls. A machine learning approach was trained with historical weather and power data of solar farms to predict the snow effect on the PV power output.

PATENTS

- Y. Fu, **S. Jiang**, "Segmentation Guided Image Generation with Adversarial Networks," *US Patent 10,825,219.* [Patent]
- Y. Fu, **S. Jiang**, B. Sun, "Light-Weight Pose Estimation Network with Multi-Scale Heatmap Fusion," *US Patent App. No.: 62/976,099. WIPO Patent App. No.: WO/2021/163103.* [Patent]
- Y. Fu, **S. Jiang**, "Video 2D Multi-person Pose Estimation using Multi-frame Refinement and Optimization," *WIPO Patent App. No.: WO 2020/232069*. [Patent]
- Y. Fu, S. Wang, S. Lee, **S. Jiang**, B. Sun, H. Mao, K. H. E. Cheung, "Systems and Methods for Virtual Facial Makeup Removal and Simulation, Fast Facial Detection and Landmark Tracking, Reduction in Input Video Lag and … ," *US Patent App. No: 16/584,310.* [Patent]

HONORS & AWARDS

NVIDIA CCS Best Student Paper Award **2021**

Champion of the CVPR 2021 Challenge on Signer-independent Isolated Sign Language Recognition **2021**

- Team leader and championships winner in both RGB and RGB-D tracks.

4th Rank in CVPR 2021 Challenge on Agriculture-Vision (Supervised Track) **2021**

PhD Network Travel Grant, Northeastern University, USA **2019**

GapFund360 Award, Northeastern University, USA **2018**

NSF I-Corps Grant, National Science Foundation **2016**

JUACEP Research Award, Nagoya University, Japan **2014**

JASSO Scholarship, Nagoya University, Japan **2014**

Outstanding Scholarship, Hong Kong Polytechnic University **2010, 2011, 2012, 2013**

ACADEMIC SERVICE

Conference Reviewer

- International Conference on Computer Vision (ICCV)
- International Joint Conferences on Artificial Intelligence (IJCAI)
- IEEE International Conference on Automatic Face & Gesture Recognition (FG)
- IEEE International Conference on Data Mining (ICDM)
- IEEE International Conference on Multimedia Information Processing and Retrieval (MIPR)

Journal Reviewer

- IEEE Transactions on Image Processing (TIP)
- Journal of Visual Communication and Image Representation (JVCI)
- The Vision Computer (TVCJ)
- IET Image Processing
- Journal of Electronic Imaging (JEI)

Workshop Reviewer

- IEEE International Workshop on Analysis and Modeling of Faces and Gestures Workshops (AMFG)

COMPUTER SKILLS

Machine Learning Frameworks:	PyTorch, TensorFlow, CoreML, TensorFlow Lite.
Programming Languages:	Python, C/C++, Java, HTML, JavaScript.
Others:	MATLAB, AWS, Tomcat, Photoshop, Premiere Pro.