Curriculum Vitae

SUN, Tao

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EDUCATION

Tongji University, Shanghai, China   Sept 2016 − Jul 2020 (*exp.*)
B. Eng. in *Software Engineering* (currently 4th year)
- **Cumulative GPA**: **4.82 / 5** or **93.17 / 100**. **Ranking**: **2 / 179** (top 1.1%).
- **Major Courses**: *Object-Oriented Programming, Data Structures, Design and Analysis of Algorithms, Data Analysis and Data Mining, Operating System, Database System Principles, Compiler Principle, Computer Organization, Computer Architecture, Computer Networks, Software Engineering, Discrete Mathematics, etc*.
- **Teaching Assistant**: *Deep Learning* (Fall 2019).

RESEARCH EXPERIENCE

Facebook Research, Facebook, Inc.   Feb 2019 − Present
Research Assistant. Supervised by Research Scientist Dr. Saikat Basu and Dr. Guan Pang. (*Funded US$ 50,000*)
- **Project**: Improve Semantic Segmentation of Structured Object, including the Connectivity of Road Extraction
- Proposed the novel idea of "whole-object segmentation" and corresponding loss terms, which reduce the total variance in local patches, to improve both the pixel and topological accuracy over SOTA methods.
- **Keywords**: Image Segmentation, Loss function, Structure-Aware CNN
- **Highlight**: Submitted a first-author paper to *CVPR 2020*.

Deep Learning Lab, Tongji University   Mar 2018 − Nov 2019
Undergraduate Research Assistant. Supervised by Prof. Yin Wang, *Ph.D*. *of University of Michigan*.
- **Project**: Road Extraction from Satellite Imagery Using Computer Vision Technology
- Designed a new stacked U-Net architecture with multiple outputs for both road segment and intersections.
- Proposed an original road extraction approach utilizing both massive GPS trajectories and satellite images. Integrated novel 1D transposed convolution, GPS argumentation and rendering methods which enabled our approach to achieve 5% higher accuracy and 40% boost in generalization ability.
- **Keywords**: Image Segmentation, CNN, Image Processing, Weakly-Supervised Learning
- **Highlight**: Published 3 papers as the first author, including *CVPR, SIGSPARIAL Workshop and CVPRW*.

X-Lab (Lab for Intelligent Operation and Maintenance), Tongji University   Oct 2018 − Dec 2018
Undergraduate Research Assistant. Supervised by Prof. Qingfeng Du and Dr. Juan Qiu.
- **Project**: Time-Series Anomaly Detection for Operation and Maintenance of Cloud Services
- Proposed a novel method of combining LSTM with VAE for anomaly detection from imbalanced performance index data of online servers. Our team is applying for a Chinese Patent of this research.
- **Keywords**: Anomaly Detection, Time-Series, RNN, LSTM, VAE

RESEARCH INTERESTS

- **Computer Vision and AI**: Image Recognition (classification, detection, segmentation), Semi-Supervised Learning, Adversarial Learning, Structure-Aware CV, 3D Problems.

PUBLICATIONS

[1] **Tao Sun**, Zonglin Di, Pengyu Che, Chun Liu, Yin Wang, "Leveraging Crowdsourced GPS Data for Road Extraction from Aerial Imagery", in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Long Beach, CA, USA, 2019.   [GitHub | Paper]

[2] **Tao Sun**, Saikat Basu, Guan Pang, "Whole-Object Segmentation using Regional Variance Losses", Submitted to *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.   (Under review)

[3] **Tao Sun**, Zehui Chen, Wenxiang Yang, Yin Wang, "Stacked U-Nets with Multi-Output for Road Extraction", in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, Salt Lake City, UT, USA, 2018.   [Paper]

[4] **Tao Sun**, Zonglin Di, Yin Wang, "Combining Satellite Imagery and GPS Data for Road Extraction", in *Proceedings of the ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery (GeoAI)*, Seattle, WA, USA, 2018. **(Oral)** [Paper]

SELECTED PROJECTS

Final-Year Project, Tongji University   Nov 2019 − Present
Image Detection and Segmentation using Adversarial PU Learning. Supervised by Prof. Hao Wu, Yin Wang.
- **Keywords**: PU (Positive-Unlabeled) Learning, Adversarial Learning, GAN, Image Recognition

Data Analysis and Data Mining, Course Project   Mar 2018 − Jun 2018
Discovery of the Frequent Patterns from Online Shopping Data. Supervised by Prof. Weixiong Rao.
- **Keywords**: Clustering, Frequent Pattern Set, Decision Tree, Boosting, GNN, Feature Embedding

Human-Computer Interaction, Course Project   Apr 2017 − Jun 2017
Gaze Controller API: Detect user's eye via camera video and reconstruct the gaze point in 3D space using OpenCV.

ACADEMIC SERVICES

- **IEEE JSTSRS** (Journal of Selected Topics in Applied Earth Observations and Remote Sensing, IF: 3.4). Reviewed 1 submission.   Jan 2019
- **ACM SIGSPATIAL 2019**. Reviewed 6 submissions (external)   Aug 2019

CAMPUS ACTIVITIES

Google Camp, Tongji University (Core Member)   Sept 2017 − May 2019
- Organized Tongji Android Summer 2018 & 2019 and delivered 6 lectures of *Deep Learning* and *Computer Vision* for undergraduate students.

Dept. of Academic and Cultural Promotion, Student Union of Tongji University   Sept 2016 − Jun 2018
(Member, Vice President, President)
- Organized 15+ lectures by famous scholars and industry experts at the campus. The maximum audience per lecture reached 500+.

SCHOLARSHIPS AND AWARDS

- **National Scholarship** (top 0.2% nationwide), The Chinese Ministry of Education   Fall 2018 − Spring 2019
- **National Scholarship**, The Chinese Ministry of Education   Fall 2017 − Spring 2018
- **First Prize Scholarship** (top 5% in the university), Tongji University   Fall 2016 − Spring 2017
- **Second Prize in National "Challenge Cup" Competition** (College Student Curricular Academic   Nov 2019
  Science and Technology Works Competition), The Chinese Ministry of Education
- **Special Prize in Shanghai "Challenge Cup" Competition**, Shanghai Municipal Bureau of Edu.   Jun 2019
- **Honorable Mention in 2018 Mathematical Contest in Modeling**, COMAP   Feb 2018
- **Finalist in 2018 Microsoft "Practice Space" Students Contest**, Microsoft Research Asia   Aug 2018
- **Second Prize in China College Students Physics Contest (Shanghai)**, Chinese Physical Society Dec 2016

SELECTED PRESENTATIONS

- **GCAAI** (German-Chinese Association of Artificial Intelligence), Shanghai, China   Sept 2019
  Invited talk "*Introduction to AI-assisted Mapping*", on behalf of the Deep Learning Lab.
- **IEEE CVPR 2019**, Long Beach, CA, USA   Jun 2019
- **ACM SIGSPATIAL 2018**, Seattle, WA, USA   Nov 2018
- **IEEE CVPR 2018**, Salt Lake City, UT, USA   Jun 2018

SKILLS

- **Programming:** Python, C/C++, Java, JavaScript (React.js, Vue.js), HTML, Swift, SQL, MATLAB, LaTeX
- **Developing:** PyTorch, TensorFlow, Sk-Learn, OpenCV, Gnuplot, MySQL, MongoDB, Spark, Linux, iOS
- **Design & Modelling:** Adobe Photoshop, Adobe Lightroom, Autodesk AutoCAD, Autodesk Inventor