SUN, Tao

B. Eng. in *Software Engineering*

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EDUCATION

Tongji University, Shanghai, China — Sep 2016 – Jun 2020 (*Exp.*)
B.Eng. in Software Engineering. (currently 4th year)

- Cumulative GPA: **4.82 / 5.00** (equivalent to **93.2 / 100**)
- Ranking: **2 / 179** (top 1.1%)
- Related Courses and Scores: *Data Mining & Analysis* (A), *Object-Oriented Programming* (A), *Data Structures* (A), *Design and Analysis of Algorithms* (A) *Operating System* (A), *Database System Principles* (A), *Compiler Principle* (A), *Computer Architecture* (A), *Computer Networks* (A).

RESEARCH EXPERIENCE

Facebook Research, Facebook Inc. — Feb 2019 – *Present*
Research Assistant. *Supervised by Research Scientist Dr. Saikat Basu and Dr. Guan Pang.*

- Project: Topological-Aware Loss Function for Detecting Linear Structures from Image
  - » Propose a new loss function to punish the fragmented prediction for linear structures, which reduces the total variance in the patches of linear structures.
  - » Improve results for road extraction, land segmentation and cell boundary detection on topological metrics.
- Keywords: Image Segmentation, CNN, Structure-Aware CNN
- Highlight: Submitted a first-author paper to *CVPR 2020*

Deep Learning Lab, Tongji University — Mar 2018 – Sep 2019
Undergraduate Research Student. *Supervised by Prof. Yin Wang.*

- Project: Road Extraction from Satellite Imagery
  - » Design new stacked U-Net architecture with outputs for both road segment and intersections.
  - » Propose original road extraction approach that utilizes both massive GPS trajectories and satellite images.
  - » Integrate new 1D transposed convolution, GPS argumentation and rendering methods which enable our approach achieve 5% higher accuracy and 40% boost in generalization ability when predicting new area.
- Keywords: Image Segmentation, CNN, Image Processing, Weakly-Supervised Learning, Point-based CNN
- Highlight: Published 3 papers as the first author, including *CVPR*, *SIGSPARIAL Workshop* and *CVPRW* papers

X-Lab (Lab for Intelligent Operation and Maintenance), Tongji University — Sep 2018 – Jan 2019
Undergraduate Research Student. *Supervised by Prof. Qingfeng Du and Dr. Juan Qiu.*

- Project: Time-Series Anomaly Detection for Operation and Maintenance of Cloud Services
  - » Propose a novel method that combines LSTM with VAE for anomaly detection from imbalanced performance index data from online servers.
- Keywords: Time-Series, LSTM, VAE, GMM
- Highlight: Applied for 1 Chinese Patent

Research Interests: Image Recognition (Classification, Detection, Segmentation), Few-shot Learning, Weakly-/Un-Supervised Learning, Visual Reasoning

PUBLICATIONS

Conference Paper

[1] **T. Sun**, Z.-L. Di, P.-Y. Che, C. Liu, and Y. 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. Link

[2] **T. Sun**, S. Basu, G. Pang, "Local Variation Loss for Semantic Segmentation of Linear Structures ", *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020. (*Under review*)

Workshop Paper

[3] **T. Sun**, Z.-H. Chen, W.-X. Yang, Y. 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. Link

[4] **T. Sun**, Z.-L. Di and Y. 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**) Link

ACADEMIC SERVICES

Reviewer

- **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) Jul 2019

SELECTED PROJECTS

Data Mining & Analysis, Course Project, Tongji University Mar 2018 – Jun 2018
Discovery the Frequent Patterns of Online Shopping Data. *Supervised by Prof. Weixiong Rao*
- Keywords: GCN (Graph Convolution Network), Frequent Pattern Set, Decision Tree, Feature Embedding

Data Warehouse, Course Project, Tongji University Sep 2018 – Jan 2019
Amazon Movie: Knowledge Graph. *Supervised by A/Prof. Hongmin Zhu*.
- Design Spark and Neo4j programs that mine the graph information of Amazon Movie dataset.

Human-Computer Interaction, Course Project, Tongji University Sep 2017 – Jan 2018
Gaze Control: Eye Gaze Detection API. *Supervised by A/Prof. Ying Shen*.
- Detecting user's gaze point at in 3D space using OpenCV and reconstructing the at the screen.

Are You Feeling Tired?, National SITP Project Apr 2017 – *Present*
Funded by the *National Students Innovation Training Program (SITP) of China* (RMB 20,000.00)
- Develop mobile App to help people custom their working schedule corresponding to their biological rhythm.

CAMPUS ACTIVITIES

Dept. of Academic and Culture Promotion, Students Union of Tongji University Sep 2016 – Jun 2018
Member, Vice President, President
- Inviting famous scholars and industry experts to give lectures at the campus.
- Working with the Department members to organize 15+ lectures. Maximum number of audience reaches 500.
- Maintaining online accounts of the Department. The WeChat account has nearly 10k subscribers.

Google Camp, Tongji University Sep 2017 – *Present*
Core Member
- Invited to attend DevFest 2018 and DevFest 2019 organized by Google Developer Groups (GDG).
- Organized Tongji Android Summer 2018 and delivered courses about Deep Learning and Computer Vision for undergraduate students.

AWARDS & SCHOLARSHIPS

- **National Scholarship**, China's Ministry of Education 2018 Fall – 2019 Spring
  For top 0.2% undergraduate students nationwide.
- **National Scholarship**, China's Ministry of Education 2017 Fall – 2018 Spring
- **Student Scholarship, First Class**, Tongji University 2016 Fall – 2017 Spring
  For top 5% students in the university.
- **Special Prize in** 16^{th} **"Challenge Cup" National College Student Curricular Academic Science and Technology Works Competition** (in Chinese: "挑战杯"), Shanghai's Ministry of Education 2019
- **Honorable Mention in 2018 Mathematical Contest in Modeling**, COMAP 2018
- **First Prize in** 33^{rd} **China College Students Physics Contest, Shanghai**, Chinese Physical Society. 2016

LANGUAGE PROFICIENCY

- **Chinese (Mandarin)**: Native language.
- **English**: Fluent.
  - » TOEFL: **107** (Reading: 29, Listening: 30, Speaking: 23. Writing: 25)
  - » GRE: **323** (Verbal: 153, Quant: 170, AW: 4.0)

SKILLS

Programming
- Proficient: Python, C, C++
- Intermediate: JavaScript, Java, Swift, SQL, MATLAB

Research
- Machine Learning: PyTorch, Keras, TensorFlow, Pandas, Sk-Learn, OpenCV
- Academic Writing: TEX, LATEX

General
- Developing: Xcode, Visual Studio, MySQL, Spark
- Multimedia & Design: Adobe Photoshop, Adobe Lightroom, Autodesk AutoCAD, Autodesk Inventor