

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*, *SIGSPATIAL 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 <ul style="list-style-type: none"> ▪ IEEE JSTARS (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	<p>Data Mining & Analysis, Course Project, Tongji University Mar 2018 – Jun 2018 Discovery the Frequent Patterns of Online Shopping Data. <i>Supervised by Prof. Weixiong Rao</i></p> <ul style="list-style-type: none"> ▪ Keywords: GCN (Graph Convolution Network), Frequent Pattern Set, Decision Tree, Feature Embedding <p>Data Warehouse, Course Project, Tongji University Sep 2018 – Jan 2019 Amazon Movie: Knowledge Graph. <i>Supervised by A/Prof. Hongmin Zhu</i></p> <ul style="list-style-type: none"> ▪ Design Spark and Neo4j programs that mine the graph information of Amazon Movie dataset. <p>Human-Computer Interaction, Course Project, Tongji University Sep 2017 – Jan 2018 Gaze Control: Eye Gaze Detection API. <i>Supervised by A/Prof. Ying Shen</i></p> <ul style="list-style-type: none"> ▪ Detecting user's gaze point at in 3D space using OpenCV and reconstructing the at the screen. <p>Are You Feeling Tired?, National SITP Project Apr 2017 – Present Funded by the <i>National Students Innovation Training Program (SITP) of China</i> (RMB 20,000.00)</p> <ul style="list-style-type: none"> ▪ Develop mobile App to help people custom their working schedule corresponding to their biological rhythm.
CAMPUS ACTIVITIES	<p>Dept. of Academic and Culture Promotion, Students Union of Tongji University Sep 2016 – Jun 2018 Member, Vice President, President</p> <ul style="list-style-type: none"> ▪ 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. <p>Google Camp, Tongji University Sep 2017 – Present Core Member</p> <ul style="list-style-type: none"> ▪ Was invited to attend DevFest 2017 and DevFest 2018 organized by Google Developer Groups (GDG) Shanghai. ▪ Organized Tongji Android Summer 2018 and delivered courses about Deep Learning and Computer Vision for undergraduate students.
AWARDS & SCHOLARSHIPS	<ul style="list-style-type: none"> ▪ 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 16th "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 33rd China College Students Physics Contest, Shanghai, Chinese Physical Society. 2016
LANGUAGE PROFICIENCY	<ul style="list-style-type: none"> ▪ Chinese (Mandarin): Native language. ▪ English: Fluent. <ul style="list-style-type: none"> » TOEFL: 107 (Reading: 29, Listening: 30, Speaking: 23, Writing: 25) » GRE: 323 (Verbal: 153, Quant: 170, AW: 4.0)
SKILLS	<p>Programming</p> <ul style="list-style-type: none"> ▪ Proficient: Python, C, C++ ▪ Intermediate: JavaScript, Java, Swift, SQL, MATLAB <p>Research</p> <ul style="list-style-type: none"> ▪ Machine Learning: PyTorch, Keras, TensorFlow, Pandas, Sk-Learn, OpenCV ▪ Academic Writing: T_EX, L^AT_EX <p>General</p> <ul style="list-style-type: none"> ▪ Developing: Xcode, Visual Studio, MySQL, Spark ▪ Multimedia & Design: Adobe Photoshop, Adobe Lightroom, Autodesk AutoCAD, Autodesk Inventor