Shuyang Wu

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***Current Interest**: Computational Sustainability, Video Segmentation, Visualization, Data Mining*

Education

Shanghai Jiao Tong University
Shanghai, China

B.S. in Environmental Engineering — *Sept. 2015 - Exp. June 2020*

- **GPA** - 83/100 (3.3/4.0)
- **Standard Test** - TOEFL: 106 (R28 + L30 + S24 + W24), GRE: 327 (V157 + Q170 + AW3.5)
- **Relevant Coursework** -
  - **Math**: Linear Algebra, Probability and Statistics, Calculus
  - **Basic CS**: Programming, Theory of Computation, Architecture, OS, Cryptography, Software Engineering
  - **Specialized CS**: Data Science, Data Mining, HPC, Data Visualization, VR/AR Program U3D Design, Unreal Game Design

Technical University of Denmark
Kgs. Lyngby, Denmark

Exchange Student — *Jan. 2018 - Aug. 2018*

- **Relevant Coursework** - Machine Learning, Algorithms and Data Structure, Database Systems

Publication

[1] **S. Wu**, H. Meng, K. Zhang, Y. Zhao, "Deep learning based high-content screening for small molecules that modulate zebrafish cardiac function." *Nature Chemical Biology*. Submitted

Research Experience

Automatic Detection Model for Zebrafish Cardiovascular Parameters
Shanghai, China

Advisor: Prof. Yanbin Zhao, Assistant Professor at Environmental Health Group, SJTU Environment — *Feb. 2019 - Dec. 2019*

- Implemented end-to-end video segmentation model to detect parameters of zebrafish ventricle based on a customized Unet with pretrained ResNet encoder, reaching IoU at 91% and videos whose parameter error below 10% conform to 90%
- Proposed two interactive methods to detect artery parameters based on customized canny detector with OpenCV, raising detection rate from 75% to 88% and 20 times reducing time consumption
- Built model for detecting pericardial effusion and ventrical wall thickness, based on adaptive floodfill and spectral clustering, to provide enough generalization for various input
- Improved model from data collection, proposed best possible video shooting setup based on Unet architecture and test results of different setups

Analysis of Stormwater Quality Data from Online Sensors on Highway
Kgs. Lyngby, Denmark

Advisor: Prof. Luca Vezzaro, Associate Professor at Section of Water, DTU Environment — *Feb. 2018 - June 2018*

- Analyzed and interpreted three-year spatiotemporal data of highway runoff quality, collaborating with *SWIgroup Italy*.
- Applied xgboost for short-term model and LSTM for 24h prediction, to forecast the possible pollution events, which reached RMSE to 0.29/0.35 respectively, reliable enough for stormwater effect
- Implemented spectrum and factor analysis to detect patterns and explained impact of different parameters under maximal information coefficient, showing temperature and pH have significantly affected conductivity
- Proposed a mixed spatiotemporal interpolation method for completing outliers detected by LOF and missing values, to reach both higher spatial and temporal autocorrelation

Selected Projects

Generation of Chinese Memes (Biaoqingbao) with Deep Learning
Shanghai, China

Advisor: Prof. Liyao Xiang, Assistant Professor at John Hopcroft Center for Computer Science, SJTU — *Apr. 2019 - June 2019*

- Built a image captioning model with ResNet50 and Show-Attend-and-Tell model. Applied Stochastic Beam Search, instead of Local Beam Search, to avoid local maxima and generate various meme captions
- Built a Chinese meme dataset in two ways: directly crawling Chinese meme-caption pair from Internet, and translating meme dataset with English captions into Chinese with scripts due to shortage of categorized Chinese meme
- Achieved perplexity at 5.16 and the model could generated endless humorous memes for people to choose from

Feature Encoding and Domain Adaption for Image Classification
Shanghai, China

Advisor: Prof. Li Niu, Assistant Professor at Department of Computer Science and Technology, SJTU — *Apr. 2019 - June 2019*

- Applied traditional feature extraction techniques (SIFT, SURF, ORB) and deep learning model (ResNet50) to extract local descriptor from Animals with Attributes (AwA2) dataset
- Used feature encoding methods (Bag-of-Word, VLAD, Fisher Vector) to encode the derived local descriptor and test the performance of each combination of approaches, proving the superiority of deep learning model for both accuracy and time consumption
- Implemented traditional domain adaptation methods (TCA, CORAL, KMM, JDA) and deep methods (MMD, Deep-CORAL, CMD) on extracted features from Office-Home Dataset. Results showed traditional methods got better accuracy (10% more) with limited computing resources

AR-based Closed Caption in Cinema

Shanghai, China

Advisor: Yancong Ma, Principal of VR/AR Lab, SJTU Student Innovation Center *Sept 2019 - Dec. 2019*

- Built AR Closed Caption with ARCore and OpenCV, to replace traditional device in cinema, for helping people with hearing loss and foreigners to better immerse in movies
- Applied OpenCV on Unity to detect screen out of surroundings, and displayed subtitles at selected place with anchors

Visualization of traffic flow evolution and congestion for traffic guidance

Shanghai, China

Advisor: Prof. Huijuan Dong, Associate Professor at BASICS lab, SJTU *Apr. 2019 - June 2019*

- Applied real-time trip line, scatter point and 3D heat map on 50,000 taxi orders, based on deck.gl and d3.js, to visualize each track and show traffic congestion interactively.
- Displayed and correctly summarized traffic flow evolution of all three key areas and five congestion area with visualization.
- Offered possible traffic guidance suggestions based on relevant information and visualization.

Automatic Classification for Systematic Review in Food Toxicokinetics

Kgs. Lyngby, Denmark

Advisor: Prof. Finn Årup Nielsen, Associate Professor at Section for Cognitive Systems, DTU Compute *July 2018 - Sept. 2018*

- Applied an ensemble model of Logit Regression, xgboost and Multilayer Perceptron to classify abstracts of scientific articles in Food Toxicokinetics into 9 areas, to reduce researchers' workload
- Raised the precision from 9% of the original model to 22.4%, to filter out 2/3 irrelevant papers for manual workload, with metric using precision at 95% recall
- Reached strong interpretability with high relevance between experts' review and top ten important words from model, extracted from LIME

Simulation&Visualization on Air Pollutants Transmission of Power Plants

Shanghai, China

Advisor: Prof. Zhen Cheng, Associate Professor at Air Pollution Group, SJTU Environment *Oct. 2017 - Dec. 2017*

- Crawled emission data of two power plants next to campus. Simulated and visualized pollutants transmission and their impact with weather and air quality data based on CALPUFF and customized visualization script.
- Reproduced and proved 'horrified' chimneys of power plants contribute little on awful air quality in campus with simulation results, when SO_2 would account for 9% of background value, while TSP and NO_X account for much less in worst situation.

Extracurricular Activities

SJTU Ourdoor Association

Shanghai, China

Vice President / First Aid Team Leader *Oct. 2015 - PRESENT*

- Led team of 40 people twice for two-night hiking without connection to outside world. Performed as a core member in the hiking team, including team leader and first aid doctor.
- Re-constructed the publicity systems of the association inside and outside the campus. Invited outdoor experts for club-wise speech and responsible for liaison and activity arrangement.

World Wildlife Fund(WWF) China

Shanghai, China

Education Department, Long-term Volunteer *Oct. 2017 - Apr. 2018*

- Collected and edited 100+ pieces of news in environmental education, science, policies each week from various resources, to deliver real-time environmental information to teenagers. Got more than 15k views.
- Initiated a weekly book sharing blog, recommending one environment related books for all ages. Organized offline sharing meetings with 20 teenagers twice.

Honors & Awards

- **B/C-class University Scholarship** Twice, Top 15% in SJTU *2017 & 2018*
- **Outstanding Undergraduate Research Project** Top 10% in Shanghai *2017*
- **Merit Student** Top 5% in SJTU *2016*

Skills

Programming	**Python**, **C/C++**, C#, R, MATLAB, JavaScript, HTML, CSS, Shell, SQL
Software&Toolkits	PyTorch, TensorFlow, CUDA, Git, LaTeX, D3.js, Unity3D, Unreal, MySQL, Arduino, AutoCAD
Interests	Any activities involving mountains | Creating Chinese cuisine from other culinary styles