# Sihan Wei

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## Education

Sep. 2018 – present **M.S. in Computer Science**, *University of Minnesota, Twin Cities*, GPA: 3.54/4.00.
Advisor: Prof. Ju Sun

Sep. 2014 – Jun. 2018 **Wuhan University**, Wuhan, China.
B.Eng. in Electrical Engineering, GPA:3.74/4.00

**Course Highlights:** Machine Learning ($A$), Deep Learning ($A$), Artificial Intelligence ($A$), Matrix Theory ($A$), Probability and Statistics ($A$), Linear Algebra ($A$), Calculus ($A$), Convex Optimization ($A$), Spatial Data Science Research ($A$)

## Research Experiences

Jan. 2020 – present **Deep Learning Group**, University of Minnesota
Advisor: Prof. Ju Sun.
Working on high-order methods
- Implemented accelerated tensor methods proposed by Yurii Nesterov to solve unconstrained convex optimization problems using 3-rd order Taylor Approximation
- Proved the rate of convergence and presented a lower complexity bound for the tensor methods
- Experimented our methods on different optimization problems and compared the performance with classic methods

Apr. 2017 – Sep. 2017 **Remote Oceanography Lab**, Wuhan University
Advisor: Prof. Xiongbin Wu .
Working on real-time maritime route planning
- Implemented the route planning algorithm based on Ant Colony Optimization and simulated in MatLab
- Built database for storing radar data and supporting website functions with MySQL

Mar. 2016 – Mar. 2017 **Digital Signal Processing Lab**, Wuhan University
Advisor: Dr. Lan Zhang .
Working on assistant decision-making system of maritime search and rescue
- Presented a new algorithm based on 2-D spatial grid interpolation to locate the drowning people with real-time radar data
- Simulated the algorithm and plotted the trajectory in MatLab
- Developed a website in PHP to demonstrate the trajectory of people using BaiduMap API

## Working Experiences

Sep. 2017 – Dec. 2017 **China Academy of Electronics and Information Technology**, Beijing, China
Mentor: Dr. Yifeng Liu.
Working on Rule-Transformer based on the Consciousness Prior
- Implemented the KLT algorithm in C++ to track human keypoints with OpenPose and OpenCV
- Proposed an algorithm to detect the abnormal behavior of pedestrians
- Modified the vanilla OpenPose libaray to promote concurrency for multi-cameras and cut down the cost of thread scheduling, which improved the video performance by **30%**, from 15 FPS to 20FPS

## Selected Projects

May 2020 **GAN-UNet: Non-negative Matrix Factorization Using Deep Neural Networks**.

- Introduced an end-to-end deep neural network framework GAN-UNet for non-negative matrix factorization (NNMF)
- Tested our model on different datasets to assess the performance in terms of reconstruction error to show our method has a generalization ability under different scenarios
- Discussed the ability of symmetry breaking in our model from a perspective of inverse problems

May 2020 **Regional Co-location Pattern Detection**.

- Reviewed the previous work in this field and discussed the pros and cons of their methods
- Proposed a Unique Quadruplet Enumeration algorithm to detect regional co-location patterns
- Proved the time complexity of our method
- Conducted experiments and a case study on the Chicago Crime Dataset to assess the performance and validate the robustness of our model

## Publications

Dec. 2017 Assistant Decision-Making System of Maritime Search and Rescue Based on High-Frequency Surface Wave Radar

**Sihan Wei**, Luhuai Jiao, Qi Li, Juncai Liu, Jianxuan Yang and Lan Zhang.
Journal of China Academy of Electronics and Information Technology, Vol 12, No. 5, 2017, pp. 540-545. doi:10.3969

## Awards and Honors

2015 – 2017 **Academic Excellence Scholarship(top 5%)**, *Wuhan University*.

Dec. 2017 **Outstanding Award**, *Hubei Undergraduate Innovation and Entrepreneurship Competition(**0.13%**)*.

Nov. 2017 **First Prize**, *China Undergraduate Mathematical Contest in Modeling(**top 1%**)*.

Sep. 2017 **First Prize**, *TI Cup Undergraduate Electronic Design Contest(**top 2%**)*.

Jun. 2018 **Outstanding Graduate(top 10%)**, *Wuhan University*.

## Skills

**Programming Languages:** Python, C/C++, Java, Matlab, Bash, HTML/CSS, Javascript

**Tools and Frameworks:** Pytorch, Tensorflow, Git, LaTeX, scikit-learn, Django, Bootstrap