# Sihan Wei

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## Education

Sep. 2018 – present **University of Minnesota, Twin Cities**, Minneapolis, MN.
M.S. in Computer Science, GPA:3.54/4
Advisor: Prof. Ju Sun

Sep. 2014 – Jun. 2018 **Wuhan University**, Wuhan, China.
B.Eng. in Electrical Engineering, GPA:3.74/4

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

## Research Experience

Jan. 2020 – present **Tensor Methods: Theoretical Advances, Challenges and Applications**, University of Minnesota
Advisor: Prof. Ju Sun.
Working on high-order methods
- Implemented second-order and third-order tensor methods as well as their accelerated version, proposed by Yurii Nesterov
- Assessed the performance of tensor methods on different problems, including a parametric family of difficult functions and logistic regression
- Currently working on applying second-order (Newton-type) methods in non-convex min-max optimization problems, e.g., GAN training

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

## Professional Experience

Sep. 2017 – Dec. 2017 **China Academy of Electronics and Information Technology**, Beijing, China
Mentor: Dr. Yifeng Liu.
Working on abnormal behaviour detection
- 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 **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**.
- Proposed a Unique Quadruplet Enumeration algorithm to detect regional co-location patterns
- Introduced a number of new pruning metrics that lay the ground work to developing even better algorithms in future
- Conducted experiments and a case study on the Chicago Crime Dataset to assess the performance and validate the robustness of our model

## Teaching Experience

Fall 2020 **Information and Decision Sciences**, Carlson School of Management.
Teaching Assistant
- MSBA 6310: Programming for Data Science
- MABA 6311: Programming for Business Analytics

## Awards and Honors

2015 – 2017 **Academic Excellence Scholarship(top 5%)**, *Wuhan University*.
Dec. 2017 **Outstanding Award**, *Hubei Undergraduate Innovation 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