Sihan Wei

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Education

Sep. 2018 – present **University of Minnesota, Twin Cities**, Minneapolis, MN.
M.S. in Computer Science, GPA:3.54/4.00
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), Computer Vision ($A-$), Matrix Theory (A), Probability and Statistics (A), Linear Algebra (A), Calculus (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 cubic regularization of Newton's method and accelerated tensor methods proposed by Yurii Nesterov to solve unconstrained convex optimization problems using 3rd-order Taylor Approximation
- Experimented our methods on different optimization problems and compared the performance with second-order 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 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 **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**.

- 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

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