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, which is a second-order method
- Implemented 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

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