Yiwen Song

Email : gavinsyw@sjtu.edu.cn
Mobile : +86-13917603450

Education

- **Shanghai Jiao Tong University** — Shanghai, China
  Bachelor of Engineering in Electronics and Electric Engineering — *Sept. 2017 - Jun. 2021*
  - **IEEE Pilot Class**: an elite program aiming to cultivate scientists in computer science, electrical and electronic technology, and information science based on MIT's educational model.
  - **Zhiyuan Honor Program of Engineering**: an selective program for **top5%** talented engineering undergraduate students.
  - **Major GPA**: 88.2/100; **Overall GPA**: 87.8/100
  - **Mathematics Training**: Linear and Convex Optimization, Probability and Stochastic Process, Discrete Mathematics, Linear Algebra, Mathematical Analysis
  - **Zhiyuan Scholarship**: all possible academic year

Research Interests

Networked Systems, Mobile Communications, Network Optimization, Mobile Computing, Data-Driven Applications in the Intersection of Machine Learning and Networks

Publications

- **Yiwen Song**, Haiming Jin, "**Minimizing Entropy for Crowdsourcing with Combinatorial Multi-Armed Bandit**", *submitted to IEEE INFOCOM 2021 IEEE International Conference on Computer Communications*
- Chonghuan Wang, **Yiwen Song**, Haiming Jin, "**Towards Minimum Fleet for Ridesharing-Aware Mobility-on-Demand Systems**", *submitted to IEEE INFOCOM 2021 IEEE International Conference on Computer Communications*
- Chonghuan Wang, **Yiwen Song**, Haiming Jin, Lu Su, Fan Zhang, Xinbing Wang, "**Optimizing Cross-Line Dispatching for Minimum E-Bus Fleet**", *submitted to IEEE Trans. on Mobile Computing*

Research Experience

- **Multipath Transmission for Video Streaming**
  Advisor: Prof. Lili Qiu — *Jun. 2020 - Present*
  - Conduct literature review broadly on precoding/beamforming, including both theoretical works and system works.
  - Conclude that putting users with the same in common in one group when using precoding is the best solution for maximizing spectral efficiency based on theoretical derivation.
  - Observe the pattern and performance with different beamforming methods through simulations, and adapt precoding schemes to analog beamforming schemes for comparing their performance.
  - Discover multipath underlying impact on current beamforming schemes, and adjust beamforming to deal with multipath effects.

- **Minimizing Entropy for Crowdsourcing with Combinatorial Multi-Armed Bandit**
  Advisor: Prof. Haiming Jin *Jan. - Jul. 2020*
  - Study the worker selection problem in a crowdsourcing system for minimizing cumulative empirical entropy.
  - Design a worker selection mechanism that minimizes the empirical entropy of the results submitted by workers involved, through formulating worker selection, deriving an estimation of the upper confidence bound for empirical entropy minimization, and leveraging it in the minimum entropy upper confidence bound (ME-UCB) algorithm.
  - Conduct theoretical analysis and prove that ME-UCB has a regret upper bound of $O(1)$, surpassing the existing algorithms focusing on submodular MABs.
  - Run extensive experiments on randomly-generated datasets and real-life RTE dataset to validate the performance of our algorithm compared to several baseline algorithms.
- **Urban Mobility-on-Demand (MoD) Systems with Ridesharing**
  Advisor: Prof. Haiming Jin *Oct. - Dec. 2019*
  - Address the fundamental problem in ridesharing-aware MoD systems via exploiting smart dispatching strategies at city-scale to minimize the number of vehicles needed in urban areas for heterogeneous mobility demands.
  - Utilize graph-theoretic methods to construct an efficient and realistic model and formulate the problem into a tree cover problem, proved as NP-hard.
  - Propose and implement a dynamic programming-based polynomial-time algorithm with a guaranteed approximation ratio.
  - Run extensive experiments on a dataset containing 21 million orders and validate the effectiveness of the proposed algorithms.
- **Optimizing Cross-Line Dispatching for Minimum E-Bus Fleet**
  Advisor: Prof. Haiming Jin *Jan. - Jul. 2019*
  - Propose a city-scale cross-line dispatching strategy to minimize the number of e-buses needed for public transportation demands in urban e-bus systems.
  - Formulate the cross-line dispatching optimization problem as a combinatorial optimization over the constructed graph and prove it is NP-hard with no $(2 - \epsilon)$-approximation algorithms.
- **Fundamental Limits of Secure Decentralized Crowdsourcing for Data Collection**
  Advisor: Prof. Shuo Shao *Oct. 2018 - Mar. 2019*
  - Investigate the fundamental limits of the work load-communication load tradeoff region for secure decentralized crowdsourcing system for data collection to exploit tradeoff between work load and communication load.
  - Propose and implement a task assignment scheme using coding theory, reaching a lower communication load under a same work load.
  - Build outer bounds for the secure decentralized crowdsourcing system for multi-experiments, and prove the proposed scheme is order optimal in general and partially exact optimal.
  - Report: https://drive.google.com/file/d/1CJhGZbFMYcLfg2uGwIe9JFxeVOnzi1uT/view?usp=sharing

Programming Skills

- **Languages**: Proficient in Python, C/C++; Fluent in Java, HTML, Javascript, PHP, MATLAB
- **OS**: Linux (Ubuntu, Debian), Windows
- **Tools**: Anaconda, TensorFlow