Zishuo ZHAO

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ISE, University of Illinois Urbana-Champaign

1 Background

- **2021/01 - now** PhD student, Department of Industrial & Enterprise Systems Engineering, University of Illinois Urbana-Champaign
  Research Area: Operations Research
- **2020/08 - 2021/01** Research Assistant, Haihua Institute for Frontier Information Technology
- **2016/05 - 2020/07** Undergraduate student, Yao Class, Institute for Interdisciplinary Information Sciences, Tsinghua University
- **2015/08 - 2016/05** Undergraduate student, Department of Computer Science and Technology, Tsinghua University
- **2012/09 - 2015/06** No.1 Middle School Affiliated to Central China Normal University

2 Research Interests

I am a first-year PhD student in UIUC, majoring in operations research. My research interests span a wide scope including scheduling, pricing, fair division, algorithm design, mechanism design and game theory. I have an affection for adopting the ideas and tools in theoretical computer science into applications of modern research topics including optimization and machine learning.

I also have an amateur interest in computational geometry and topology, which was my research interest during undergraduate time. I have always been excited to solve or prove research problems with geometric and topological inspirations.

3 Publications and Manuscripts

3.1 Publications

ClusterSLAM: A SLAM Backend for Simultaneous Rigid Body Clustering and Motion Estimation

Jiahui Huang, Sheng Yang, Zishuo Zhao, Yukun Lai, Shi-Min Hu.

Accepted for ICCV 2019. [Link]

3.2 Manuscripts

Dynamic Car Dispatching and Pricing: Revenue and Fairness for Ridesharing
Zishuo Zhao, Xi Chen, Xuefeng Zhang, Yuan Zhou

Noise-Stable Rigid Graphs for Euclidean Embedding
Zishuo Zhao

4 Talks

Dynamic Car Dispatching and Pricing: Revenue and Fairness for Ridesharing
Zishuo Zhao, Xi Chen, Xuefeng Zhang, Yuan Zhou
Invited to INFORMS Annual Meeting 2021

5 Academic Activities

Facilitator in section Revenue & Pricing, INFORMS Annual Meeting 2021

6 Awards

- 12th place in 2nd THUCTF Information Security Contest in Tsinghua University, 2020
- 12th place in 24th Artificial Intelligence Programming Contest in Tsinghua University, 2020
- Baidu Scholarship for Arts Excellence, 2018
- Xuetang Scholarship, 2016-2020
- 15th place in 20th Artificial Intelligence Programming Contest in Tsinghua University.
- Second Prize in Chinese Mathematical Olympiad(CMO), 2014
- First Prize in National Olympiad in Informatics in Provinces(NOIP), 2013

7 Research Experiences

Dynamic Car Dispatching and Pricing: Revenue and Fairness for Ridesharing, 2021/01 - 2021/09

- Advised by Yuan Zhou
- Developed an algorithm for ridesharing to simultaneously maximize revenue and ensure fairness with theoretic guarantees
- Used a novel two-phased pricing algorithm that decouples prices on drivers' and riders' sides to adapt to misaligned incentives and guarantee satisfaction on both sides
- Considered the stochastic nature of traffic and proposed a Thompson Sampling based algorithm to discover riders' valuations via incomplete information and balance exploration and exploitation

LiDAR-Based Map Construction and Localization, for visiting program in UC Berkeley, 2019/08 - 2020/01.

- Advised by Masayoshi Tomizuka

- Combined state-of-the-art SLAM and localization techniques with GPS data for robust localization
- Autonomous relocalization when tracking failure is detected
- Developed an "atlas" data structure with topological connections for precision and efficiency in real-time localization

Scene Analysis and Reconstruction Based on Geometric Distances, for Bachelor Thesis, 2019/03 - 2019/06.

- Advised by Shi-Min Hu
- Proposed a novel specification of geometrical stability on bar-joint frameworks for stable reconstruction against noises
- Proposed an algorithm to construct low-cost graph of distance constraints that stably determine a spatial structure
- Graded A($\geq$ 95 points)
- [arXiv:1907.06441]

ClusterSLAM: A SLAM Backend for Simultaneous Rigid Body Clustering and Motion Estimation, 2018/09 - 2019/03.

- Advised by Shi-Min Hu
- Utilization of SLAM method in reconstructing dynamic scenes and tracking moving objects
- My contribution: developed the *motion consistency matrix* and utilized *complete-linkage clustering* algorithm for clustering landmarks into motion groups
- Accepted for ICCV 2019.

Data-Driven Shape Reconstruction Using Coupled Geometric and Topological Basis, for visiting program in UT Austin, 2018/04 - 2018/11.

- Advised by Qixing Huang, Chandrajit Bajaj
- Using dictionary learning method to utilize prior knowledge in shape reconstruction
- With topological features for better structure reconstruction

Musical Instrument Classification via Low-Dimensional Feature Vectors, *research project* for Speech Science and Technology course, 2017/03 - 2017/06.

- Advised by Tan Lee, joint work with Haoyun Wang.
- 90% accuracy to classify 6 representative instruments with models of spectral features and least machine learning tools (only simple 32-dimensional SVM).
- Innovative work based on observations and explorations.
- [Source Code][arXiv:1909.08444]

Admission Score Prediction and Advice System, for Summer Internship in Sogou Inc, 2016/07.

- Utilized mathmatical models to convert Raw Scores into "Ability Levels" and calculated Ability Levels necessary for admission from data.
- Effectively negated fluctuations of difficulties and discriminative powers in different years and provinces.
- Typical error around 3-5 points (in 750), practical for advising high school graduates.
- [Source Code]

8 Coding Skills

- Mainly using C++ and MATLAB, also with command of Python, Java, PHP.
- With some knowledge in Verilog HDL and assembly language.
- Open to learning new programming languages when in need.

(Updated on Oct 21, 2021)