Liang Lyu

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Education

Massachusetts Institute of Technology, Cambridge, MA — September 2021 – Present
Ph.D. Student – Department of Electrical Engineering and Computer Science

Duke University, Durham, NC — December 2020
Bachelor of Science – Computer Science and Mathematics — GPA: 3.99 / 4.0

Research Statement

I am broadly interested in studying the impacts of algorithms on humans and society, as well as measures to mitigate the potentially undesirable consequences. My most recent work focuses on social media, more specifically the interactions between platforms, users, creators and content, the effects of platform algorithms and decisions on the behaviors of different players, and how they relate to societal issues such as the spread of misinformation. Previously, I have also worked on algorithmic fairness.

Research Projects

Dynamic Matching of Users and Creators on Social Media Platforms *2022 – Present*

- Analyzing the effects of content recommendation algorithms on user and creator behavior
- Propose a novel theoretical model that focuses on dynamic user-content matching, which incorporates incentives and participation constraints of both users and content creators
- Compare different platform recommendation schemes, such as user-centric algorithms that focus on short-term user engagement, and forward-looking algorithms that maximize long-term objectives
- Design efficient algorithms that maximize long-term engagement with theoretical and practical peformance

Misinformation Online to Offline: A Twitter Field Study *2022 – Present*

- Empirical analysis that characterizes how viral content on social media can impact other forms of news
- Focus on short phases or n-grams that appear frequently in the news, and classify them based on veracity
- Analyze time series of their popularity on both Twitter and traditional news articles, and determine whether misinformation tends to originate from social media before spreading elsewhere or vice-versa

Algorithmic Ranking: User Behavior, Platform Incentives, And Policy *2021 – Present*

- Examine the empirical impacts of platform algorithms to recommend and rank news feeds on social media, such as suggesting content based on user preferences and their friends' shared posts
- Analyze their ties to societal issues, e.g. whether misinformation and exploitative content are amplified by tailored rankings, and whether they encourage the formation of filter bubbles
- Conducting behavioral studies using surveys and an experimental platform that mimics social media feeds

Centrality with Diversity *2019 –2020*

- Introduced novel notion of *diverse* graph centrality, where nodes belong to many communities or interests
- Differs from classic graph centrality measures which do not account for heterogeneous communities
- Proposed measures that identify nodes simultaneously important to different communities
- Presented algorithms to compute fixed point solutions as a generalized nonlinear eigenvalue problem
- Designed experiments on synthetic and real-world graphs, to study normative properties of our algorithms

Proportionally Fair Clustering *2018 –2019*

- Proposed group-based notion of fairness in clustering, extending fair machine learning literature
- Notion ensures proportionality for all subsets of agents, preventing justified complaints
- Analyzed algorithms to efficiently compute, optimize and audit approximate proportional solutions
- Implemented experiments to evaluate performance and tradeoffs w.r.t. standard objectives, e.g. k-means

Automated Agenda Management *2019*

- Worked on Stanford Online Deliberation Platform, where people can discuss topics of civic interest
- Built an AI moderator and topic model to analyze and moderate the scope and depth of discussion

Publications

1. Huttenlocher, D., Li, H., **Lyu, L.**, Ozdaglar, A. and Siderius, J. Dynamic Matching of Users and Creators on Social Media Platforms. Presented at *8th Workshop on Marketplace Innovation* (**MIW 2023**).
2. **Lyu, L.**, Fain, B., Munagala, K. and Wang, K. Centrality with Diversity. In *Proceedings of the 14th ACM International Conference on Web Search and Data Mining* (**WSDM 2021**). 644-652.
3. Chen, X., Fain, B., **Lyu, L.** and Munagala, K. Proportionally Fair Clustering. In *Proceedings of the 36th International Conference on Machine Learning* (**ICML 2019**). 1032-1041.

Working Papers

1. Huttenlocher, D., Li, H., **Lyu, L.**, Ozdaglar, A. and Siderius, J. Dynamic Matching of Users and Creators on Social Media Platforms. Presented at *2023 INFORMS Annual Meeting*. Submitting soon to *Operations Research*.
2. Huttenlocher, D., **Lyu, L.**, Ozdaglar, A. and Siderius, J. Algorithmic Ranking: User Behavior, Platform Incentives, And Policy. Presented at *2022 INFORMS Annual Meeting*.

Teaching Experience

Undergraduate Teaching Assistant (UTA), Duke University *Spring 2018 – Fall 2020*

- UTA for 4 Computer Science courses over 6 semesters
- Head UTA for CompSci 201: Data Structures & Algorithms (Fall 2018 – Fall 2020)
- Developed and managed Java assignment autograders for Gradescope submissions from 500 students
- Regularly led discussion sessions and held office hours for undergraduates

Honors & Awards

MathWorks Engineering Fellowship *2023 – 2024*

David S. Y. Wong (1962) and Harold Wong Fellowship *2021 – 2022*

Honorable Mention, CRA Outstanding Undergraduate Researchers *2020*

Dean's List, Duke University *Fall 2017 – Fall 2019*

- Dean's List with Distinction *Fall 2017 – Spring 2019*

International Collegiate Programming Contest (ICPC) *2017 – 2021*

- Participated in ICPC World Finals 2020
- North America Championship: 19th (2020), 33rd (2021)
- Mid-Atlantic Regionals: 4th (2017), 4th (2018), 2nd (2019), 5th (2020)