Keerthana Gurushankar

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EDUCATION

Carnegie Mellon University, Pittsburgh, PA
PhD Student, Computer Science Aug 2022 - Present
Advisor: Nihar Shah
Master of Science, Mathematical Sciences Aug 2017 - May 2021
Thesis: Sharp Moment Comparisons for Sums of Independent Uniform Random Variables
Advisor: Tomasz Tkocz
Bachelor of Science, Discrete Math and Logic Aug 2017 - May 2021
Cumulative GPA: 3.80

PUBLICATIONS

- **Extracting Unique Information through Markov Relations**
  Keerthana Gurushankar, Praveen Venkatesh, Pulkit Grover
  Jul 2022, Allerton Conference on Communication, Control and Computing. [Preprint]

- **Sharp bounds on p-norms for sums of independent uniform random variables, 0<p<1**
  Giorgos Chasapis, Keerthana Gurushankar, Tomasz Tkocz
  May 2021, Journal d'Analyse Mathématique. [Preprint]

PUBLICATIONS (SUBMITTED)

- **What's in a Name? Linear Temporal Logic Literally Represents Time Lines**
  Runming Li, Keerthana Gurushankar*, Marijn J.H. Heule, Kristin Y. Rozier*
  Jan 2023, Journal of Computer Languages Issue on Foundations and Practice of Visual Modeling.

- **Capturing and Interpreting Unique Information**
  Praveen Venkatesh, Gabriel Schamberg, Keerthana Gurushankar
  Jan 2023, IEEE International Symposium on Information Theory 2023.

RESEARCH PROJECTS

- **Data-driven Algorithm Design for Peer Review** Aug 2022 – Present
  Advised by Professor Nihar Shah
  I'm developing matching algorithms to efficiently allocate reviewers to papers, such that the most similar papers and reviewers are assigned to each other. For this, I'm scraping datasets of submissions to the Journal of Machine Learning Research (JMLR), computing similarity scores using existing Natural Language Processing (NLP) methods, and designing and testing online matching algorithms which maximize the similarity score of the assignments they make.

* equal contribution

- **Markov-based Partial Information Decomposition** May 2021 – May 2022

  Advised by Professor Pulkit Grover

  I formulated models for extracting partial information decompositions using Markov chain models, based on applications in Fairness in Machine Learning. I developed efficient computation methods for the case of Gaussian random variables, by solving eigenvalue equations for the covariance matrices.

- **Moment Maximization Inequalities** Sep 2020 – May 2021

  Advised by Professor Tomasz Tkocz

  I studied the problems of extremizing entropy & p-norm for sums of independent uniform random variables with given variance. I solved the p-norm minimization problem when $0 < p < 1$, using Fourier-analytic approaches & bounding integrals using approximations. This settled the last open problem in a long-standing research program.

TEACHING EXPERIENCE

- **Teaching Assistant, Undergraduate Quantum Computation** Sep 2020 – Dec 2020

  Course instructed by Professor Ryan O'Donnell

  I led recitations, graded exams & typeset homework solutions, focusing on the linear algebra of quantum computation. I also interacted with students via mandatory weekly check-in videos instituted to mitigate social isolation during a fully remote semester (discussing doubts, catching up etc). Many students felt they had never connected with course staff as much as in our class. I received an overall TA rating of 4.9/5.

ACADEMIC ACHIEVEMENTS & FELLOWSHIPS

- Irwin Mark Jacobs & Joan Klein Jacobs Presidential Fellowship, MIT (offered)
- D. E. Shaw Discovery Fellowship - fellowship for female undergraduates interested in quantitative finance
- International Physics Olympiad Orientation/Selection Camp - top 35 students in Physics nationally
- NIOS Senior Secondary Board Examination - Highest score among 300,000 candidates
- KVPY Fellowship - instituted by Govt. of India, for pursuit of research careers in science

SKILLS

Programming Languages: Python, C/C++, SML, Prolog, MATLAB/Mathematica, LaTeX