Vikram Kher

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Senior Undergraduate, Computer Science & Applied Math, USC Viterbi School of Engineering

Education

University of Southern California, Los Angeles, California
Bachelor of Science, Computer Science, *Aug 2018 - Dec 2022 (Expected)*
Bachelor of Arts, Applied and Computational Mathematics, *Aug 2018 - Dec 2022 (Expected)*
Overall GPA: 3.98
Number of PhD/Graduate Courses: 5

Research Interests

Algorithm Design, Social Choice,
Computational Complexity, Enumerative Combinatorics

Publications

Patel, D., **Kher, V.**, Desai, B. et al. Machine learning based predictors for COVID-19 disease severity. Sci Rep 11, 4673 (2021). https://doi.org/10.1038/s41598-021-83967-7

Teaching

Undergraduate Teaching Assistant, Introduction to Algorithms and Theory of Computing,
Aug 2020 - Dec 2020

Awards & Achievements

- The Honor Society of Phi Kappa Phi's 2021 Summer Research Scholarship ($1,000)
- W.V.T. Rusch Undergraduate Engineering Honors Program
- Best Presentation at Viterbi Summer 2020 Research Showcase (Voted by Faculty)
- Viterbi Dean's List (2018-2021)
- USC Academic Achievement Award (2020)

Research Experience

Distortion-Based Analysis of Single Transferable Vote (STV) Mechanism
Advisor : Prof. David Kempe *Jan 2021 - Present*

- Utilized LP-duality framework and network flow techniques to conduct worst-case analysis of Single Transferable Vote mechanism
- Developed two new, streamlined proofs using flow techniques that recover STV's known distortion upperbound of $O(\ln)$
- Wrote python program to experimentally test performance of STV against various election scenarios, code available here

Modeling ICU Outcomes for COVID-19 Patients
Advisor : Prof. Assad Oberai *May 2020 - Dec 2020*

- Developed predictive modeling systems to determine ICU outcomes for COVID-19 patients based on blood draw and lung imaging data
- Found certain proteins like CRP and D-Dimer influence ICU classification
- Conducted exploratory data analysis with data sparsity matrices, t-SNE analyses, correlation matrices
- Co-authored publication in Nature's Journal of Scientific Reports available here

Projects

NP-Hardness in Popular Online Puzzle Games
Mentor : PhD Candidate Matthew Ferland *Jan 2020 - Dec 2021*

- Created 3-SAT reductions to in-game maps for the following popular puzzle games: **Baba Is You**, **Fez**, and **Catherine**
- Writing manuscript that will emphasize the educational value of the reductions in an undergraduate algorithms class

Gladeo App
Club : Code the Change *Aug 2019 - May 2020*

- Developed app for career mentorship non-profit Gladeo as part of a team
- Created backend routes to handle account creation, password resetting, among other services using Node and Express
- Enabled automatic video uploading from app using YouTube's APIs

Courses & Skills

Courses: Advanced Analysis of Algorithms (PhD Level), Complexity Theory (PhD Level), Boolean Function Analysis (PhD Level), Convex and Combinatorial Optimization (PhD Level, Spring 2022), Combinatorial Analysis (Graduate level), Applied Combinatorics, Probability Theory, Calculus I-III, Linear Algebra
Languages: C, C++, Python, Java, LaTeX

Interests & Clubs

Interests: Russian Literature, Pocket Billiards, Art History
Clubs: Code the Change (Developer Position), Association of Computing Machinery