VISHAL G. RAMAN

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EDUCATION

University of California, Berkeley *August 2019 - Present*
B.A. Computer Science, Mathematics(GPA: 3.9)
Graduate Coursework: *High-Dimensional Data Analysis, Combinatorial Algorithms, Measure Theory and Topology, Functional Analysis, Differentiable Manifolds, Partial Differential Equations, Several Complex Variables, Probability Theory, Stochastic Processes*
Undergraduate Coursework: *Artificial Intelligence, Machine Learning, Computer Architecture, Theoretical Statistics, Database Architecture, Econometrics*

WORK/RESEARCH EXPERIENCE

Berkeley Artificial Intelligence Research(BAIR) Lab *Fall 2021*
Research in theoretical deep learning/optimization under the supervision of Yi Ma; my research focuses on understanding and extending the ReduNet framework, a "white-box" deep network for high-dimensional data with an information-theoretic objective function that gives rise to operators with precise optimization and geometric interpretation.
IMC Trading, Software Engineering Intern *Summer 2021*
Developer on the FICC/Index Strategy team; worked on the component that computes and publishes several different toxicity signals associated with trade events. Conducted data analysis to optimize parameters for trade-through toxicity signals.
UC Berkeley, Research Intern *Spring 2021*
Guided research in statistics/partial differential equations under the supervision of Tyler Maltba. Used sparse regression and physically-informed neural networks(PINN) in order to render probability density functions(PDFs) or cumulative distribution functions(CDFs) for stochastic dynamical systems.
Renyi Institute, Research Intern *Fall 2020*
Group research in convex geometry under the supervision of Gergely Ambrus. Studied relaxations of Helly's theorem in order to characterize transversal properties of families of convex sets.

PROJECTS

Free Probability *Fall 2021*
Advised by Dan-Virgil Voiculescu. Supervised reading studying Free Probability Theory, which generalizes the notion of independent random variables to Operator Algebras in order to study non-commutative distributions. Has a variety of applications in random matrix theory, combinatorics, quantum information theory, etc.
Pizza Market Making *Summer 2021*
Autotrader competition at IMC Trading - handles multiple correlated symbols, hitting and quoting, arbitrage detection, etc. Uses volume/price offsets, position management, Volume Weighted Average Price(VWAP) valuation.
Geodesic Convex Optimization *Spring 2021*
Reading and implementation project covering differential and Riemannian geometry, geodesic convexity, and applications to non-convex optimization problems such as computing the Brascamp-Lieb constant and the operator scaling problem.(CS 270 at Berkeley)

HONORS

William Lowell Putnam Mathematical Competition - Top 500 *Winter 2020*

American Invitational Mathematics Exam(AIME) Qualifier *Spring 2019*

United States of America Physics Olympiad (USAPhO) - Honorable Mention *Spring 2019*

United States of America Computing Olympiad(USACO) - Gold Division *Spring 2018*

Programming Languages: Python, Java, C++, R, SQL, MongoDB, LaTeX
Libraries/Frameworks: NumPy, pandas, TensorFlow