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, Numerical Linear Algebra, Combinatorial Algorithms, Measure Theory and Topology, Functional Analysis, Differentiable Manifolds, Partial Differential Equations, Algebraic Topology, Probability Theory, Stochastic Processes, Dynamical Systems*
Undergraduate Coursework: *Artificial Intelligence, Machine Learning, Deep Neural Networks, Optimization Models, 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

Using the Gaussianized Coding Rate for Generative Modeling *Fall 2021*
Advised by Yi Ma, collaborated with M. Psenka and P. Tong. In the project, we consider Gaussianized Coding Rate which is used as a distributional distance for the Linear Discriminative Representation(LDR) transcription framework. In the paper, we train models using the coding rate distance on a larger class of probability distributions from common machine learning datasets and provide theoretical bounds for training stability analysis.

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)

Blackjack Markov Desicion Process *Winter 2020*
Models the Blackjack card game as a Markov Desicion Process(MDP) in order to calcuate optimal move tables without simulation though fixed-point value iteration. It also allows the user to input a card counting strategy and generate optimal move tables at each hand.

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, PyTorch, SciPy