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.

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.

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)

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