ANKITH MOHAN

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EDUCATION

PhD in Computer Science *2026* (expected)
Virginia Polytechnic Institute and State University, Blacksburg, VA, USA
Advisor: Jamie Sikora

MS in Computer Science *2020*
University of Southern California, Los Angeles, CA, USA
Advisors: Aiichiro Nakano and Emilio Ferrara
Thesis: Alleviating the Noisy Data Problem using Restricted Boltzmann Machines

BE in Information Science and Engineering *2016*
Ramaiah Institute of Technology, Bengaluru, India

RESEARCH EXPERIENCE

Fujitsu Research of America *May - August, 2022*
Research Intern *Sunnyvale, CA*

Advisor: Sarvagya Upadhyay

Virginia Polytechnic Institute and State University *2021 - Present*
Graduate Research Assistant *Blacksburg, VA*

Advisor: Jamie Sikora

· Developing semi-definite programming techniques for inner approximations to the quantum separability problem.
· Researching NISQ-based methods to reduce large qubit systems to a size that is amenable for these inner approximation methods.
· Formulating a better quantum equivalent for the Wasserstein semi-metric to improve performance of the quantum Wasserstein Generative Adversarial Network (qWGAN).

University of Southern California *2018 - 2020*
Research Assistant *Los Angeles, CA*

Advisor: Sze-Chuan Suen

· Researched on techniques to model the effectiveness of *Pre-exposure prophylaxis* (PrEP) on HIV/AIDS outcomes in Los Angeles county.
· Developed interactive web application that allows online modeling of HIV/AIDS outcomes.
· Designed end-to-end deep learning pipeline to predict mortality of patients at Sutter Health based on patient characteristics, vitals, labs and interventions.

Information Sciences Institute *January - May, 2019*
Directed Research Assistant *Marina Del Rey, CA*

Advisors: Robert F Lucas and Jeremy Liu

· Modeled large-scale reactive molecular dynamics (RMD) simulations data set of MoS_2 monolayer to be able to denoise grain boundaries and defects.
· Used restricted Boltzmann machines (RBM) and limited Boltzmann machines (LBM) which was sampled using D-Wave adiabatic quantum annealer (AQA).

· Improved the performance of the LBM by finding techniques to efficiently reassign its hidden units to the qubits of AQA.

TEACHING EXPERIENCE

Introduction to Problem Solving in Computer Science, *Fall 2021*

JOURNAL ARTICLES

Ankith Mohan, Aiichiro Nakano, and Emilio Ferrara. "Graph signal recovery using restricted Boltzmann machines". *Expert Systems with Applications* 185 (2021): 115635.

Jeremy Liu, **Ankith Mohan**, Rajiv K. Kalia, Aiichiro Nakano, Ken-ichi Nomura, Priya Vashishta, and Ke-Thia Yao. "Boltzmann machine modeling of layered MoS2 synthesis on a quantum annealer". *Computational Materials Science* 173 (2020): 109429.

Krishnaraj P. M., **Ankith Mohan**, and Srinivasa K.G. "Performance of procedures for identifying influentials in a social network: prediction of time and memory usage as a function of network properties". *Social Network Analysis and Mining* 7, no. 1 (2017): 34.

PRESENTATIONS

Talks

Ankith Mohan. "NISQ Algorithms for Separable Ground States". VT Quantum Information Science Symposium, April 2022.

Posters

Ankith Mohan, Tobias Haug, Kishor Bharti and Jamie Sikora. "Inner Approximations and a NISQ Algorithm for the Quantum Separability Problem". 25th Annual Conference on Quantum Information Processing, March 2022.

TEXTBOOK

Krishnaraj P.M., **Ankith Mohan**, and Srinivasa K.G. *Practical Social Network Analysis with Python*. Springer International Publishing, 2018.

HONORS AND AWARDS

Best Research Award, Department of Computer Science, University of Southern California *2021*

OPEN-SOURCE PROJECTS

denoiseRBM `https://github.com/ankithmo/denoiseRBM`

· Model-agnostic pipeline to recover graph signals by exploiting content-addressable memory property of RBM and the hidden layer representations of a deep neural network (DNN).
· Pipeline can be used for any dataset but is particularly effective for graph-structured datasets.
· Requires the deep neural network to be trained on *clean* data, data which is free of noise.

estimateMI `https://github.com/ankithmo/estimateMI`

· Implementation of Ziv Goldfeld, Kristjan Greenewald, Yury Polyanskiy. (2019) "Estimating Differential Entropy under Gaussian Convolutions".

· Estimating the mutual information between the input layer and each of the hidden layer representations using a *noisy* DNN, where additive white Gaussian noise (AWGN) is injected to each of these representations.
· Extending the work to estimate information flow in graph neural networks.

Deep Pommerman `https://deep-agents.github.io/`

· Solving the game of Pommerman using deep reinforcement learning.
· Cooperated with five teammates to design both curriculum learning and reward engineering methods to progressively train the game agent.
· Trained agents that used imitation learning or Monte Carlo tree search methods to track and eliminate opponent agents.

SKILLS

Languages

Python, R, Matlab, C++

Libraries

Deep learning: PyTorch, Tensorflow, Theano
Geometric deep learning: PyTorch geometric, Deep Graph Library, Graph Nets
Quantum computing: PennyLane, Qiskit, Cirq, Tensorflow Quantum
Visualization: Dash, R Shiny