ABISHRANT **PANDAY**

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EDUCATION

HARVARD UNIVERSITY
Cambridge, MA
May 2022

A.B. CANDIDATE IN MATHEMATICS SECONDARY IN ECONOMICS, MASTER'S CANDIDATE IN CS GPA: 3.9/4.0

Relevant Coursework Math 55A: Honors Linear and Abstract Algebra, Math 55B: Honors Real and Complex Analysis, Math 231A: Graduate Algebraic Topology, CS 223: Probabilistic Analysis and Algorithms, CS 226R: Algorithmic Fairness and Differential Privacy, CS 229R: Error Correcting Codes, CS 234R: Computation in Networks and Crowds, CS 238: Optimized Democracy, CS 281: Advanced Machine Learning

Projects CS 238: GAErryChain, Improving MCMC Random Walk Sampling With GAEs, CS 234: Network Diffusion With Conflicting Parties, CS 281: Neural Machine Translation and Multi-Agent Networks for Protein Structure Prediction, CS 223: Iterative Skyline Computation Through Noisy Comparisons, CS 226R: Algorithmic Fairness in Post-Processed Toxicity Text Classification, APCOMP 275: Characterization of $Cs(Pb/Ti)X_3$ Perovskites, Econ 2099: Economic Inefficiencies in Prison Labor Programs

Organizations HackHarvard, Harvard-MIT Math Tournament, Harvard Computer Society, Harvard Asian American Dance Troupe, Harvard Radio (WHRB), Student Astronomers at Harvard-Radcliffe (STAHR)

HUNTER COLLEGE HS
New York, NY
Jun 2018

GPA: 4.0/4.0 SAT: 800 MATH, 800 READING, 22/24 WRITING

Relevant Coursework Calculus III with Analytic Geometry, Vector Analysis, Linear Algebra, Differential Equations, AP BC Calculus, AP Chemistry, AP Physics C: Mechanics & Electricity and Magnetism, AP Computer Science A, AP Micro/Macro Economics, Organic Chemistry

Organizations Science Olympiad, The Leading Strand, Science Bowl, Math Team, The Observer, I-Help Liberia

Awards High School National Champtionship Tournament (1ST Place), Scholastic Art & Writing Awards (National Silver Medal, 5x Regional Gold), 2017 Siemens Competition Semifinalist, NYC Science & Engineering Fair (2ND Place in CS), Moody's Mega Math Challenge (Top 78/1121 Papers)

EXPERIENCE

ALLIANCEBERNSTEIN
New York, NY
Jun 2021 - Present

TRADING INTERN
- As an algorithmic trading/quantitative finance intern, created models to predict intraday trading volume and historical institutional volume
- Built real-time algorithms to determine retail-traded stocks through social media analysis and incorporated metrics into trading platform
- Created application to generate automatic trading reports
- Worked primarily in Python, C#, MySQL, kdb+

AXON
Seattle, WA
May 2020 - Aug 2020

SOFTWARE ENGINEER INTERN IN REAL TIME COMMUNICATIONS TEAM
- Built the backend framework for Admin and Integrations for AXON's Evidence line of products in order to enable effective communication, data processing, and handling for police and emergency responders
- As a summer intern, applied techniques from algorithmic design to improve performance and scalability
- Worked primarily in Java, Ruby, MySQL

LABORATORY OF NANOSCALE OPTICS
Harvard University
Jan 2019 - Present

MACHINE LEARNING AND QUANTUM OPTICS INTERN
- Laboratory of Dr. Marko Loncar. Applied machine learning and inverse design principles towards improving waveguide design for silicon vacancy (SiV) centers in diamond nanocavities, which are used to develop multi-node quantum networks
- Used generative adversarial networks (GANs) for determining waveguide structure and constructing higher efficiency grating couplers

STONY BROOK UNIVERSITY
Jun 2017 - Sep 2017

MATERIALS SCIENCE AND ENGINEERING RESEARCHER
- Laboratory of Dr. Miriam Rafailovich. Developed polymer solar cell active layer with enhanced morphology through PMMA addition, along with a model of light absorption and reflection within a photovoltaic cell

ROCKEFELLER UNIVERSITY
Jun 2016 - Dec 2016

IMMUNOLOGY RESEARCH INTERN
- Laboratory of Dr. Daniel Mucida and Dr. Bernardo Reis. Studied T-cell receptors found within intestinal lymphocytes in *Mus musculus*
- Developed an extracellular method of studying intraepithelial lymphocyte and intestinal epithelial cell interactions *in vitro*

PROJECTS

GAERRYCHAIN: IMPROVING MCMC RANDOM WALK SAMPLING WITH GAES [2021]
- Improved on Markov Chain Monte Carlo sampling algorithms for gerrymandering detection by employing a grapn auto-encoder architecture.
- Showed significant computational improvements as well as the ability to generate semi-contiguous districts.

NETWORK DIFFUSION WITH CONFLICTING PARTIES [2021]
- Created and implemented a model for network propagation in the presence of two parties and explored its dynamics, including optimal seeding strategies and budget constraints.
- Determined the effectiveness of several heuristics on the Facebook ego graph dataset.

ALGORITHMIC FAIRNESS IN POST-PROCESSED TOXICITY TEST CLASSIFICATION [2020]
- Studied the effect of the switching stochastic gradient descent (SSGD) algorithm on the Jigsaw Unintended Bias in Toxicity Classification dataset.
- Constructed similarity and distance metrics and showed their effectiveness in determining individual fairness. Demonstrated the effectiveness of using the post-processing SSGD algorithm proposed in literature to enforce a proxy for individual and group fairness on the task of text classification with sensitive labels.

NEURAL TRANSLATION AND EVOLUTIONARY MULTI-AGENT NETWORKS FOR *AB INITIO* PROTEIN STRUCTURE PREDICTION [2019]
- Developed new computational approaches for the protein structure prediction (PSP) problem based on neural machine translation and multi-agent evolutionary algorithms on cubic lattices. Approaches developed using amino acid residue and structure information from the Protein Data Bank and ProteinNet12 databases.
- Created ProteinSearch, which builds on RNNsearch and uses bidirectional encoding, decoding to model inter-residue dependence within secondary structure conformation
- Created MultiFold, a multi-agent evolutionary algorithm, which determines spatial protein conformations with lowest global energy.

All relevant papers can be found on my website and code for these and other personal projects is hosted on GitHub.

SKILLS

LANGUAGES Python, Java, C++, Ruby/Rails | HTML5, CSS, Bootstrap | TensorFlow, PyTorch | MATLAB, Quantum Espresso
SKILLS Machine Learning, Mathematical Modeling, Algorithm Design, Backend Infrastructure Design