

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\(Pb/Ti\)X₃ 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 Championship 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

· Current algorithmic trading/quantitative finance intern

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 graph 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