

ABISHRANT PANDAY

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EDUCATION

HARVARD UNIVERSITY
Cambridge, MA
May 2021 [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 129: Number Fields, Math 136: Differential Geometry, Math 137: Algebraic Geometry | Statistics 210: Graduate Probability I | CS 281: Advanced Machine Learning, CS 223: Random Processes and Algorithms, CS 226R: Algorithmic Fairness and Differential Privacy, CS 229R: Error Correcting Codes, CS 124: Data Structures and Algorithms, APCOMP 275: Computational Design of Materials | Economics 2099: Market Design | Physics 16: Honors Mechanics and Special Relativity, Physics 153: Electrodynamics

Projects 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 (Co-director, partnerships team), Harvard-MIT Math Tournament (Problem writer, spokesperson), Harvard Computer Society, Harvard Rock Climbing, WHRB (radio)

HUNTER COLLEGE HS
New York, NY
Jun 2018

GPA: 4.0/4.0 (UNWEIGHTED) 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 (Founder and Captain), The Leading Strand (Editor-in-chief), Science Bowl (Captain), Math Team (Captain), The Observer (Staff Writer), I-Help Liberia (President)

Awards High School National Championships 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

AXON
Seattle, WA
May 2020 - Aug 2020

SOFTWARE ENGINEER INTERN IN REAL TIME COMMUNICATIONS TEAM

- Built the frontend/backend framework for the Admin Portal in 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, created an Audit system for the Scorpius team that is integrated with the Admin Portal and Audit pipeline.
- 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
- Developed generative adversarial networks (GANs) for determining waveguide structure and constructing higher efficiency grating couplers

THE GARCIA CENTER
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
- Utilized additive-induced columnar self-assembly to create method for increasing active layer thickness while maintaining efficiency

LABORATORY OF
MUCOSAL IMMUNOLOGY
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* and demonstrated efficacy of model in pathogen and drug trials

PROJECTS

ALGORITHMIC FAIRNESS IN POST-PROCESSED TOXICITY TEST CLASSIFICATION [2020]

- In a team of two, 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. Showed 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.

MODELING THE EFFECT OF CLIMATE CHANGE ON THE NATIONAL PARK SERVICE [2017]

- Honorable mention (Top 78/1121) paper in the 2017 MathWorks Math Modeling Challenge
- Worked in a team to find independent data sets and create model combining sea level rise, erosion, temperature, and human activity in order to account for the likelihood and severity of climate-related events on National Parks within the next 50 years

MATHEMATICALLY MODELING THE SPREAD OF ZIKA THROUGH TWITTER ANALYSIS [2017]

- New York City Science and Engineering Fair 2nd place in computer science, JSJS Semifinalist
- Worked in a team of two to develop a computational model aimed at predicting locations of future Zika virus outbreaks; tested efficacy against airline data
- Created a wrapper for visualizing Twitter data through Python

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