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 $Cs(Pb/Ti)X_3$ 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 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

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
- 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 likeliehood and severity of cimate-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 decelop 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