

JOSHUA PEDRO

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EDUCATION

2017 - 2020 **CUNY City College** M.S. Mathematics

Graduate Courses:

Adv. Mathematical Statistics, Adv. Topics in Statistics, Stochastic Processes, Machine Learning, Real Analysis, Complex Analysis.

2012 - 2016 **University of Guyana** B.S. Economics

TEACHING EXPERIENCE

Mount St. Michael Academy Bronx, NY

High School Teacher

Aug 2021 - present

Developed curricula and taught classes to 150+ students, grades 9-12, in Algebra II/Trigonometry, Pre-algebra, Precalculus, and AP Calculus. I have a deep understanding of the high school curriculum and the skills and knowledge required to prepare students for NYS Regents and AP exams.

CUNY City College New York, NY

Adjunct Lecturer

Aug 2018 - present

- Math 15000: Mathematics for the Contemporary World (5×)
- Math 19500: Precalculus (3×)
- Math 20100: Calculus I (2×)
- Math 21200: Calculus II (1×)
- Math 20300: Calculus III (1×)
- Math 20500: Elements of Calculus (1×)
- Math 20900: Elements of Calculus & Statistics (9×)

Graduate Teaching Assistant

Aug 2019 - May 2021

Supported students taking graduate courses Math A7800: Advanced Mathematical Statistics I and Math B7800: Advanced Mathematical II. Graded projects and exams, and provided detailed feedback to all students.

Phagoo Learning Center Georgetown, Guyana

Math Teacher

May 2012 - Aug 2016

Taught high school students classes in Prealgebra, Precalculus, Algebra I, Algebra II, Trigonometry, Geometry, Calculus, Statistics and Probability, and Economics in preparation for AP level, and SAT exams. This experience has given me a deep understanding of the high school curriculum and the skills and knowledge required to prepare students for their exams.

RESEARCH EXPERIENCE

CUNY Research Foundation New York, NY

Research Assistant

Dec 2020 - present

- Conducted literature reviews, analyzed data, and contributed to the writing and editing of research papers in the field of Economics and Epidemiology.
- Assisted in the design and implementation of experiments, collected and processed data, and contributed to data analysis.
- Collaborated with principal investigators and co-researchers to generate research ideas and proposals.
- Presented research findings at seminars.
- Maintained accurate and organized data records and databases.

CUNY City College New York, NY

Rich Internship

May 2018 - Oct 2018 & May 2020 - Oct 2020

Developed models in Python to understand medical datasets on patients infected with COVID-19. Created visualizations and simulations using NetworkX in Python and graphs in Mathematica for the purpose of simulating dynamic social networks. These experiences have given me a strong understanding of data analysis and modeling using Python, which I have been able to apply in my work as a researcher and educator.

Wolfram Research Waltham, MA

Student Researcher

Jul 2019 - Dec 2019

Developed an algorithm in Mathematica for generating images using new techniques in machine learning. This experience has given me a strong understanding of machine learning and its applications, which I have been able to apply in my work as a researcher and educator.

PROJECTS

Powdery mildew policy optimization

Ongoing

Building a model of the spread of fungi in hops and simulating the economic impact. Using optimal control policy to minimize cost on farms that produces hops and are affected by a powdery mildew fungus. Model disease spread and effects on cost of mitigating and loss in quality and yield. Source code is on a private GitHub repository until published.

Comparing fatality of patients with COVID-19 and the flu using machine learning methods

[Link to Demo](#)

Used Deep Learning (DL) with Long-Short Term Memory (LSTM), Extreme Gradient Boosting (XG-Boost), and fully connected neural networks to predict the survival status of patients with COVID-19 and compare these results with the flu.

A predictive model for mortality of COVID-19 patients using machine learning

[Link to Demo](#)

Worked with a team of research scientists to develop models in Python to understand medical datasets on patients infected with COVID-19. The data consists of 75 features for which XGBoost was used to select those features which are most important. We also created a function in Pytorch that takes data from blood samples of patients as input and outputs a survival probability with a validation accuracy of 93.9%.

Transfer learning with invertible neural networks

[Link to Demo](#)

Given a set of images, we train a neural network to learn the distribution from which these images are represented then use this distribution to generate images that look like those in the dataset. We then use transfer learning to see how well the network can generate images it has not seen before given only a few examples.

An Econometric Model of Network Formation and Its Implementation

[Link to Demo](#)

In most of the real world social and economic networks, there are some common features, which are widely observed. *Homophily*, which refers to the tendency of individuals to make connections or friendships with other like-minded individuals, and *degree heterogeneity*, which refers to the variation in the total number of links per individual, are some of the common features. The presence, absence, and magnitude of such features influence information diffusion, the spread of epidemics, and social learning procedures on the underlying networks.

AWARDS AND INVOLVEMENT

- Awarded the Dr. Barnett and Jean Hollander Rich Mathematics Summer Internship for outstanding students in Mathematics in 2018 and 2020.
- Graduated the Wolfram Summer School in 2019.
- Vice President of the University of Guyana's Economics Society in 2015.

RELEVANT SKILLS

Computer Languages Python, SQL, Matlab, Mathematica, R, SAS, SPSS, Excel, ~~TeX~~
Spoken Languages English

REFERENCES

Joseph Bak	Associate Professor, Assistant Chair Email: jbak@ccny.cuny.edu	CUNY City College Phone: 212-650-5175
Asohan Amarasingham	Associate Professor Email: aamarasingham@ccny.cuny.edu	CUNY City College Phone: 212-650-5112
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