JOSHUA PEDRO

joshfpedro | joshuapedro | joshuapedro.com | jpedro@ccny.cuny.edu

Education

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

Graduate Courses:
`Adv. Mathematical Statistics`, `Adv. Topics in Statistics`, `Stochastic Processes`, `Machine Learning`, `Real Analysis`, `Complex Analysis`.

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

Experience

CUNY Research Foundation New York, NY

Researcher 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.

Mount St. Michael Academy Bronx, NY

Math Teacher Aug 2021 - present

- Developed curricula and taught classes to students in grades 9-12, in Algebra II/Trigonometry, Prealgebra, Precalculus, and AP Calculus.

CUNY City College New York, NY

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 `Adv. Mathematical Statistics` and `Adv. Topics in Statistics`.

Rich Scholar May 2018 - Oct 2020

– Developed models in Python to understand medical datasets on patients infected with COVID-19. Created visualizations and simulations using Python and Mathematica for the purpose of simulating dynamic social networks.

Wolfram Research Waltham, MA

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.

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.

Projects

Powdery mildew policy optimization *Ongoing*

Building an epidemiological 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. Used `R` and `Python`.

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 (XGBoost), and fully connected neural networks to identify important biomarkers and 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, R, SQL, Matlab, Mathematica, SAS, SPSS, Excel, LaTeX`
Spoken Languages	`English`