OSCAR ALEJANDRO GOMEZ QUINTERO

+971 (0)54 304 2253 | oscar.gomez@nyu.edu | oscargomezq.github.io

Research Interests: interpretable and interactive machine learning, fairness, visualization, HCI

EDUCATION

B.S. Mathematics, B.S. Computer Science GPA: 3.89 / 4.00
New York University Abu Dhabi, *Abu Dhabi, UAE* Aug 2016 – May 2020
NYU Courant Institute of Mathematical Sciences, *New York, USA* Feb 2019 – May 2019

Relevant Coursework: Machine Learning, Algorithmic Foundations of Data Science, Visual Analytics, Probability and Statistics, Advanced Probability, Mathematical Statistics, Software Engineering, Computational Social Science

PUBLICATIONS

[1] **ViCE: Visual Counterfactual Explanations for Machine Learning Models**. **Oscar Gomez**, Steffen Holter, Jun Yuan and Enrico Bertini. *ACM Conference on Intelligent User Interfaces (IUI 2020).*

[2] **Exploring Music Collections: An Interactive, Dimensionality Reduction Approach to Visualizing Songbanks. Oscar Gomez**, Kaustuv Kanti Ganguli, Leonid Kuzmenko and Carlos Guedes. *ACM Conference on Intelligent User Interfaces (IUI 2020).* Demo paper.

[3] **Mapping the Sounds of the Swahili coast and the Arab Mashriq: Music research at the intersection of computational analysis and cultural heritage preservation**. Konstantinos Trochidis, Beth Russell, Andrew Eisenberg, **Oscar Gomez**, Kaustuv Kanti Ganguli, Carlos Guedes, Virginia Danielson and Christos Plachouras. *6th International Conference on Digital Libraries for Musicology (DLfM 2019).* Poster paper.

RESEARCH PROJECTS

Machine Learning Explainability and Visualization Aug 2019 – Present
Visualization and Data Analytics Lab at NYU, *New York, USA* June 2018 – Aug 2018

- Developed machine learning models to predict customer credit risk from a FICO line of credit dataset.
- Generated instance explanations by implementing algorithms to detect the most important features and the minimal set of changes needed to alter the model's output.
- Developed global explanations in the form of interactive visualizations to explore the individual explanations through a hierarchical organization that groups similar instances.
- Expanded the project by developing *ViCE*, a tool that generates and provides an interactive visual interface for counterfactual explanations [1].

Machine Learning for Musical Analysis Sept 2019 – Present
Music and Sound Cultures Group at NYU Abu Dhabi, *Abu Dhabi, UAE* Feb 2017 – May 2018

- Developed and implemented the computational analysis of two non-western music collections for the project "Computationally-Engaged Approaches to Rhythm and Musical Heritage" [3].
- Performed musical feature extraction and conducted an exploratory analysis of the data by using dimensionality reduction with deep autoencoders.
- Developed an interactive visualization depicting the musical similarity of the data by using k-means clustering and t-SNE embedding, where users can listen to the clips and explore artists clustered together [2].

Capstone Project in Mathematics Sept 2019 – Present
Mathematics Department at NYU Abu Dhabi, *Abu Dhabi, UAE*

- Researched applications of the Random Cluster Model for geometric fitting and hypergraph clustering.
- Studied methods for simulating Ising, Potts, and Random Cluster models such as Glauber dynamics and the Swendsen-Wang algorithm.
- Analyzed, through the theory of Markov chains, the conditions for convergence to a stable distribution for an algorithm using the random cluster model for robust geometric fitting.

WORK EXPERIENCE

Data Science Intern June 2019 – Aug 2019
nexquare, *Dubai, UAE*

- Enhanced machine learning models, used to predict student performance and employability, that process 800 million data points across more than 220 schools in over 10 countries.
- Developed an interpretable machine learning module that provides students, educators, regulators, and ministers explanations for the models' decisions and incorporated it within the company's advanced analytics platform.
- Implemented model agnostic interpretability algorithms (local feature importance and counterfactual explanations).

LEADERSHIP

President, NYUAD Mathematics Club Jan 2017 – Dec 2018
New York University Abu Dhabi, *Abu Dhabi, UAE* Sept 2019 – Present

- Programmed activities for high school students and guest speaker talks for university students.
- Prepared the syllabus and led the weekly training sessions in preparation for international competitions.
- Coordinated and supervised NYUAD's team participation in the International Mathematics Competition of 2018 and the Al-Khwarizmi International Mathematical Competition of 2018.

AWARDS

Second Place, FICO Explainable Machine Learning Challenge Jan 2019
Honorable Mention, Al-Khwarizmi International Mathematical Competition Oct 2018
Honorable Mention, International Mathematical Olympiad (IMO) July 2016
Best Entrance Exam Score (Nationally), Universidad Nacional de Colombia Apr 2016
Silver / Bronze Medals, Centroamerican / Iberoamerican Mathematical Olympiads Sept / June 2014

SKILLS

Programming: Python, R, C, C++, JavaScript, HTML, CSS, Git
Data Science / Visualization: scikit-learn, Keras, SQL, Spark, D3.js, Bokeh, Plotly, Tableau, LaTeX
Languages: Spanish (Native), English (Fluent), French (Basic)