OSCAR ALEJANDRO GOMEZ QUINTERO

+971 (0)54 304 2253 | oag229@nyu.edu | oscargomezq.github.io

EDUCATION

B.S. Mathematics, B.S. Computer Science Aug 2016 – May 2020
New York University Abu Dhabi, *Abu Dhabi, UAE* GPA: 3.89

Research Interests: interpretable and interactive machine learning, visualization, human-computer interaction, optimization, fairness

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).* To appear.

[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, to appear.

[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 EXPERIENCE

Capstone Project in Mathematics Sept 2019 – Present
Mathematics Department at NYU Abu Dhabi, *Abu Dhabi, UAE*
Supervised by Dr. Alberto Gandolfi

- 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 the algorithm proposed in "The random cluster model for robust geometric fitting". Pham, T. et. al. (2014).

Research in Machine Learning Explainability and Visualization Aug 2019 – Present
Visualization and Data Analytics Lab at NYU, *New York, USA* June 2018 – Aug 2018
Supervised by Dr. Enrico Bertini

- Developed machine learning models to predict customer credit risk from a FICO line of credit dataset.
- Generated instance explanations for the best performing model 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.
- Presented the project (second place in the FICO Explainable Machine Learning challenge) at the 2019 DARPA Explainable Artificial Intelligence (XAI) PI Meeting.
- Expanded the project by developing *ViCE*, a tool that generates and provides an interactive visual interface for counterfactual explanations [1].

Research in Machine Learning for Musical Analysis Sept 2019 – Present
Music and Sound Cultures Group at NYU Abu Dhabi, *Abu Dhabi, UAE* Feb 2017 – May 2018
Supervised by Dr. Carlos Guedes

- 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].

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.
- Implemented model agnostic interpretability algorithms (local feature importance and counterfactual explanations) and incorporated them within the company's advanced analytics platform.

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
- **Bronze Medal**, Iberoamerican Mathematical Olympiad Sept 2014
- **Silver Medal**, Centroamerican and Caribbean Mathematical Olympiad June 2014

SKILLS

- **Programming**: Python, C, C++, R, JavaScript, HTML, CSS, Git, LaTeX
- **Data Science / Visualization:** scikit-learn, Keras, D3.js, Bokeh, Plotly, Tableau, SQL
- **Languages:** Spanish (Native), English (Fluent), French (Rudimentary)
- **Relevant Coursework:** Introduction to Machine Learning, Algorithmic Foundations of Data Science, Visual Analytics, Probability and Statistics, Advanced Probability, Software Engineering, Fairness, Mathematical Statistics and Machine Learning (Spring 2020), Computational Social Science (Spring 2020)