

OSCAR ALEJANDRO GOMEZ QUINTERO

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EDUCATION

B.S. Mathematics, Computer Science - *Cum Laude*

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

SKILLS

Languages: Python, R, C, C++, JavaScript, Java, Mathematica, SQL

Libraries and Tools: SciPy, Numpy, Pandas, Sklearn, Keras, Spark, D3.js, Bokeh, Plotly, Tableau, Flask, Shiny, LaTeX, Git, Bash, Linux

WORK EXPERIENCE

Data Science Intern

June 2019 – Aug 2019

nexquare, *Dubai, UAE*

- Developed and incorporated an interpretability module for machine learning models processing over 800 million data points across more than 220 schools in over 10 countries.
- Developed model agnostic interpretability algorithms (local feature importance and counterfactual explanations).
- Integrated the Python and R backend for the analytics app, allowing seamless use of models developed in both languages.

RESEARCH PROJECTS

Statistical Mechanics Simulations and Models

Sept 2019 – July 2020

Mathematics Department at NYU Abu Dhabi, *Abu Dhabi, UAE*

- Proposed and studied a generalization of the Potts model with a penalty term on the number of colors in configurations.
- Developed Markov-Chain Monte Carlo simulations for the model based by generalizing the Swensen-Wang algorithm.
- Analyzed the model's properties analytically, finding its infinite phase transitions using the theory of random partitions.

Machine Learning Explainability and Visualization

June 2018 – Aug 2018

Visualization and Data Analytics Lab at NYU, *New York, USA*

- Trained SVMs, Random Forests, and Neural Networks to predict customer credit risk from a FICO home credit dataset.
- Generated instance explanations for the models based on feature importance and counterfactuals.
- Developed global explanations as interactive visualizations of clusters of individual instances.
- Developed the open source library *ViCE*, for interactive visualizations of counterfactual explanations - *Publication [1]*.

Machine Learning for Musical Analysis

Feb 2017 – May 2018

Music and Sound Cultures Group at NYU Abu Dhabi, *Abu Dhabi, UAE*

- Lead the computational analysis for an Arab/African music collection with more than 5000 songs.
- Performed dimensionality reduction with deep autoencoders on the spectrogram of the audio and the extracted MFCCs.
- Developed an interactive webapp to explore musical similarity by using k-means clustering and t-SNE embedding, and collaborated to create a Virtual Reality rendering of the similarity space - *Publications [2], [3]*.

LEADERSHIP

President, NYUAD Mathematics Club

Jan 2017 – Dec 2018

New York University Abu Dhabi, *Abu Dhabi, UAE*

- 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.

A W A R D S

Second Place , NYUAD International Hackathon for Social Good in the Arab World	Apr 2020
Second Place , FICO Explainable Machine Learning Challenge	Jan 2019
Honorable Mention , Al-Khwarizmi International Mathematical Competition	Oct 2018
Full Scholarship , New York University Abu Dhabi	Aug 2016
Honorable Mention , International Mathematical Olympiad (IMO)	July 2016
Best National Entrance Exam , Universidad Nacional de Colombia	Apr 2016
Silver / Bronze Medals , Centroamerican / Iberoamerican Mathematical Olympiads	Sept / June 2014

P U B L I C A T I O N S

- [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.