

# OSCAR ALEJANDRO GOMEZ QUINTERO

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## EDUCATION

### B.S. Mathematics, B.S. Computer Science

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

NYU Courant Institute of Mathematical Sciences, *New York, USA*

GPA: 3.89 / 4.00

Aug 2016 – May 2020

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

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## 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)

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## WORK EXPERIENCE

### Data Science Intern

nexquare, *Dubai, UAE*

June 2019 – Aug 2019

- 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).

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## RESEARCH PROJECTS

### Machine Learning Explainability and Visualization

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

Aug 2019 – Present

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

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

Sept 2019 – Present

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

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

Sept 2019 – Present

- 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.

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## LEADERSHIP

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### 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.

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## AWARDS

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**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

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## PUBLICATIONS

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- [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.