

# Oscar Alejandro Gomez Quintero

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## EDUCATION

- **New York University Abu Dhabi** Abu Dhabi, UAE  
• *B.S. Mathematics, Computer Science (Cum Laude) - GPA: 3.89/4.00* Aug 2016 - May 2020  
• *Coursework:* Machine Learning, Algorithmic Foundations of Data Science, Visual Analytics, Probability and Statistics, Advanced Probability, Mathematical Statistics, Software Engineering, Computational Social Science, Operating Systems

## SKILLS

- **Languages:** Python, R, JavaScript, C, C++, Java, Mathematica, SQL
- **Libraries/Tools:** SciPy, NumPy, Pandas, Sklearn, Keras, Spark, D3, Bokeh, Tableau, Flask, RShiny, Git, Bash, Linux,  $\text{\LaTeX}$

## WORK AND RESEARCH EXPERIENCE

- **Statistical Mechanics Models and Simulations Research** Abu Dhabi, UAE  
• *Mathematics Department at NYU Abu Dhabi* Sept 2019 - July 2020
  - Proposed and studied a generalization of the Potts model with a penalty term on the number of colors in configurations.
  - Devised and implemented Markov-Chain Monte Carlo simulations by generalizing the Swendsen-Wang algorithm.
  - Analyzed the model's properties analytically, proving its infinite phase transitions using the theory of random partitions.
- **Data Science Internship** Dubai, UAE  
• *nexquare* June 2019 - Aug 2019
  - 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 back-end for the analytics app, allowing seamless use of models developed in both languages.
- **Machine Learning Explainability and Visualization Research** New York, USA  
• *Visualization and Data Analytics Lab at NYU Tandon School of Engineering* June 2018 - Aug 2018
  - 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.
- **Machine Learning for Musical Analysis Research** Abu Dhabi, UAE  
• *Music and Sound Cultures Group at NYU Abu Dhabi* Feb 2017 - May 2018
  - Led the computational analysis for an Arab/African music collection with more than 10,000 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 provided insight to create a Virtual Reality rendering of the similarity space.

## SELECTED PROJECTS

- **FICO Explainable Machine Learning Challenge (2nd Place Winner):** Webapp with global and local explanations for machine learning models predicting customer credit risk. Tech: Python, JS, D3, Flask, Sklearn.
- **ViCE (Open source Python library):** Computations and interactive visualizations of counterfactual explanations for machine learning models. Tech: Python, JS, D3, Flask, Sklearn.
- **TaskJam (2nd Place Winner - NYUAD International Hackathon 2020):** App to motivate and connect people in lockdown with similar tasks during the COVID pandemic. Tech: Python, Flask, MongoDB.
- **Can success in International Science Olympiads predict future scientific impact?:** Computational Social Science final project. Scraped and analyzed data from five international olympiads. Tech: Pandas, BeautifulSoup, Bokeh, Seaborn.

## SELECTED PUBLICATIONS

- **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).
- **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.

## HONORS AND AWARDS

- **Full Scholarship:** New York University Abu Dhabi 2016-2020
- **Honorable Mention:** Al-Khwarizmi International Mathematical Competition Oct 2018
- **Best Admission Score (Nationally):** Universidad Nacional de Colombia Apr 2016
- **Honorable Mention/Bronze/Silver:** International/Iberoamerican/Centroamerican Math Olympiads 2014-2016

## LEADERSHIP

- **President, NYU Abu Dhabi Mathematics Club** Abu Dhabi, UAE  
• Led weekly training sessions. Coordinated events and guest talks with the department. Jan 2017 - Dec 2018