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, Shiny, Git, Bash, Linux, 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*