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, finding 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*
- 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 provided insight to create a Virtual Reality rendering of the similarity space.

PROJECTS

- **FICO Explainable Machine Learning Challenge (2nd Place Winner)** Webapp with global and local explanations for an SVM predicting customer credit risk. Tech: Python, JS, D3, Flask, Sklearn.
- *ViCE* **(Open source Python library)** Greedy 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 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

- **Honorable Mention:** Al-Khwarizmi International Mathematical Competition — Oct 2018
- **Full Scholarship:** New York University Abu Dhabi — Aug 2016
- **Best Entrance Score in the Country:** 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*