OSCAR ALEJANDRO GOMEZ QUINTERO

+971 (0)54 304 2253 | oscar.gomez@nyu.edu | oscargomezq.github.io

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, JavaScript, C, C++, Java, Mathematica, SQL
Libraries and Tools: SciPy, Numpy, Pandas, Sklearn, Keras, Spark, D3, Bokeh, Plotly, Tableau, Flask, Shiny, LaTeX, Git, Bash, Linux

EXPERIENCE

Statistical Mechanics Simulations and Models   Sept 2019 – July 2020
Mathematics Department at NYU Abu Dhabi, *Abu Dhabi, UAE*

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

Data Science Intern   June 2019 – Aug 2019
nexquare, *Dubai, UAE*

o   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.
o   Developed model agnostic interpretability algorithms (local feature importance and counterfactual explanations).
o   Integrated the Python and R backend for the analytics app, allowing seamless use of models developed in both languages.

Machine Learning Explainability and Visualization   June 2018 – Aug 2018
Visualization and Data Analytics Lab at NYU, *New York, USA*

o   Trained SVMs, Random Forests, and Neural Networks to predict customer credit risk from a FICO home credit dataset.
o   Generated instance explanations for the models based on feature importance and counterfactuals.
o   Developed global explanations as interactive visualizations of clusters of individual instances.
o   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*

o   Lead the computational analysis for an Arab/African music collection with more than 5000 songs.
o   Performed dimensionality reduction with deep autoencoders on the spectrogram of the audio and the extracted MFCCs.
o   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*

o   Programmed activities for high school students and guest speaker talks for university students.
o   Prepared the syllabus and led the weekly training sessions in preparation for international competitions.
o   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.