

# JACOB QUINTERO

[jacobquintero@math.arizona.edu](mailto:jacobquintero@math.arizona.edu)

## EDUCATION

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### University of Arizona

2022-2026

Doctor of Philosophy in Applied Mathematics; *in progress*

### Arcadia University

2018-2022

Bachelor of Arts in Mathematics and Computer Science; GPA: 3.63

## RESEARCH EXPERIENCE

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### Natural Language Models

January 2023- Present

- Currently engaged in an NLG project aimed at enhancing the diversity of generated responses. This project builds upon a previous approach that relied on Natural Language Inference (NLI) labels. To achieve this, I am utilizing neural networks to dynamically learn and assign appropriate weights to each NLI label. Additionally, I am incorporating the use of dependency trees and employing tree kernels to identify and leverage structural similarities within the data. This multi-faceted approach is geared towards broadening the range and diversity of responses generated by the NLG system.
- Contributed significantly to a research paper currently under review, which focused on enabling transformer models to answer indirect yes or no questions. My key role in this project was extending the system's functionality to include the Spanish language. This involved adapting and fine-tuning the model to effectively handle the nuances of indirect questioning in Spanish, thereby broadening its applicability and impact.
- Member of interdisciplinary team collaborating with a political scientist. Our focus is on developing transformer models to detect conflict topics in languages like Spanish and Arabic. Additionally, we aim to train political scientists to use and improve these models for this specialized application.

### Summer Undergraduate Applied Mathematics Institute

June - July 2021

*Researcher*

*Pittsburgh, PA*

- Conducted research in mathematical finance focusing on the influence of compensation schemes on investor behavior, proved results on expected behaviour given a model.
- Collaborated with a team to gather results and gave daily updates to my project advisor.

## EXPERIENCE

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### Arcadia University, Office of Institutional Research

March 2021 - May 2022

*Data Visualization Intern*

*Glenside, PA*

- Use Google Data Studio to visualize data and build dashboards.
- Clean and format the university's data using Excel and Python.
- Visualize complex data sets, draw conclusions and relationships.

### Outsmart Insight Ltd.

September - December 2020

*Data Science Intern*

*London, United Kingdom(virtual)*

- Analyzed data from various application programming interfaces to construct machine learning models.
- Collaborated with partners using Bitbucket to write programs in Python for various tasks to manage data including topic extraction with latent dirichlet allocation

## TECHNICAL STRENGTHS

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- Python and Java
- Transformer models, Hugging Face, NLP

- Bitbucket, GitHub, Anaconda, Eclipse, VScode
- Microsoft Office and Google tools including Data Studio
- Fluent in Spanish

## TEACHING AND OUTREACH

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### **Math 107: Understanding Data**

2023- Present

*Primary Instructor*

*Tucson, AZ*

- Designed lectures to guide students through elementary statistics and use of technological tools such as Excel
- Emphasized the importance of building a mathematical foundation in terminal math classes, ensuring students developed strong core skills.

### **Math 112: College Algebra and Math 116: Business Calculus**

2022 - 2023

*Teaching Assistant*

*Tucson, AZ*

- Assisted in teaching responsibilities for an entry level algebra course that prepares students for further mathematical studies.
- Held office hours to individually assist students in course material
- Taught a online section of Calculus to promote mathematical understanding a business context