

Alex John Quijano

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Curriculum Vitae

EDUCATION

UNIVERSITY OF CALIFORNIA MERCED

PH.D. IN APPLIED MATHEMATICS
Aug 2015 - Present | Merced, CA

EAST TENNESSEE STATE UNIVERSITY

B.S. IN MATHEMATICS
Aug 2011 - May 2015 | Johnson City, TN
Conc. in Computational Applied Math

NE STATE COMMUNITY COLLEGE

A.A.S. IN COMPUTER SCIENCE
Aug 2009 - May 2011 | Blountville, TN
Conc. in Computer Programming

SKILLS AND EXPERIENCE

PROGRAMMING

- Python • R • Matlab • C++ • Bash
- HTML • LaTeX • Linux

PYTHON MODULES

- Numpy • SciPy • Matplotlib • NLTK
- Tensorflow • Scikit-learn • PyTorch

MATHEMATICS

- Principal Component Analysis
- Singular Value Decomposition
- Dynamic Mode Decomposition
- Stochastic Differential Equations
- Markov Chains
- Regression
- Clustering

DATA SCIENCE

- Text Processing
- Data Mining and Visualization
- High Performance Computing (HPC)
- Sampling Methods (Bootstrapping, Cross-Validation, Markov Chain Monte Carlo)

NLP (NATURAL LANGUAGE PROCESSING)

- Word Embedding Models
- Semantic and Sentiment Analysis

MACHINE LEARNING

- Recurrent Neural Network
- Long-Short Term Memory

REFERENCES

Suzanne Sindi | Grad. Advisor
ssindi@ucmerced.edu
Rick Dale | Professor
rdale@ucla.edu

SUMMARY

- Broad experience in sophisticated mathematical methods and computing.
- Skilled at data processing and data structures.
- Adaptive communication given the interdisciplinary nature of data science.

RESEARCH INTERESTS

- Mathematical applications and interdisciplinary research in data science
- Mathematical modeling of natural languages and biological systems

CURRENT RESEARCH PROJECTS

1. TIME-SERIES ANALYSIS OF LANGUAGE EVOLUTION

PROJECT DESCRIPTION:

- The goal is to determine whether a word is stable or volatile in terms of its frequency and meaning changes. We used the Google Ngram data to analyze eight languages and compared it to a neutral model of word frequency evolution. This project is funded by the INSPIRE Grant, National Science Foundation (NSF grant No. 1344279).

COLLABORATORS:

- Suzanne Sindi - Applied Mathematics, UC Merced
- Rick Dale - Department of Communication, UC Los Angeles

2. DYNAMIC MODE DECOMPOSITION APPLICATION

PROJECT DESCRIPTION:

- Using the Google Ngram data word frequency time-series, we apply the Dynamic Mode Decomposition method to analyze the dynamics of the given language system.

COLLABORATORS:

- Suzanne Sindi - Applied Mathematics, UC Merced
- Arnold Kim - Applied Mathematics, UC Merced
- Maia Powell - Applied Mathematics, UC Merced
- Ayme Tomson - Cognitive and Information Sciences, UC Merced

3. DISCOURSE ANALYSIS OF #METOO TWITTER FRAMES

PROJECT DESCRIPTION:

- The goal is to uncover the discourse behind the #metoo movement between October 15 to October 19 2017 using NLP methods and machine learning algorithms. We collected and processed Twitter data using NLTK and several Python tools.

COLLABORATORS:

- Suzanne Sindi - Applied Mathematics, UC Merced
- Nela Van Dyke - Sociology, UC Merced
- Bryan Amos - Sociology, UC Merced

4. LARGE SCALE ANALYSIS OF IMMIGRATION DISCOURSE

PROJECT DESCRIPTION:

- The goal is to have an acute analysis of the word 'immigration' along with its word morphology. Using several sources of text data, we plan to use data science methods to answer the question of how the word changes in time given its political history.

COLLABORATORS:

- Suzanne Sindi - Applied Mathematics, UC Merced
- Nela Van Dyke - Sociology, UC Merced
- Bryan Amos - Sociology, UC Merced
- Michelle Yeung - Sociology, UC Merced

PAST RESEARCH PROJECTS

1. CRAWL: MODELING SPIDER PREDATION

PROJECT DESCRIPTION:

- The goal for this study is to model the predation movements of the sub-social spider species *Anelosimus studiosus* to determine an optimal predation strategy. We collected the specimens and recorded their movements during feeding times. We analyzed the data using modern statistical methods and modeled the movements using stochastic differential equations.

COLLABORATORS:

- Michele Joyner - Mathematics and Statistics, East Tennessee State University
- Edith Seier - Mathematics and Statistics, East Tennessee State University
- Thomas Jones - Biological Sciences, East Tennessee State University

2. MINI-ROBOTICS: ROBOT DATA ANALYSIS

PROJECT DESCRIPTION:

- The goal is to study a quadrupedal amphibious robot by collecting and analyzing data of it swimming under different pedal designs. The robot's pedal was redesigned with multiple pedal thicknesses and was programmed in different swimming gaits.

COLLABORATORS:

- Krishnanand Kaipa - Mechanical Engineering, University of Maryland
- Andrew Vogel - Mechanical Engineering, University of Maryland

PUBLICATIONS

- 2016** Quijano A. J. & Joyner, M. L., et. al. (2016). Spatio-Temporal Analysis of Foraging Behaviors of *Anelosimus studiosus* Utilizing Mathematical Modeling of Multiple Spider Interaction on a Cooperative Web. *Journal of Theoretical Biology*.
- 2015** Quijano A. J. & Joyner, M. L., et. al. (2015). An aggregate stochastic model incorporating individual dynamics for predation movements of *Anelosimus studiosus*. *Mathematical Biosciences and Engineering: MBE*, 12(3), 585-607.

TEACHING EXPERIENCE

UNIVERSITY OF CALIFORNIA MERCED | TEACHING ASSISTANT

Aug 2015 - Present | Merced, CA | Classes: Pre-Calculus, Calculus, Vector Calculus, Linear Algebra, Differential Equations, Probability and Statistics

EAST TENNESSEE STATE UNIVERSITY | MATHEMATICS TUTOR

Sept 2012 – May 2015 | Johnson City, TN | Probability & Statistics, Calculus, Linear Algebra, Differential Equations

WORKSHOP EXPERIENCE

- 2018** Leader | University of California Merced
Attending | University of Washington
Leader | University of California Merced
- 2017** Leader | University of California Merced
Leader | University of California Merced
- Introducing UNIX/LINUX and LaTeX to incoming graduate students at the University of California Merced.
Attended the 5th Annual Summer Institute in Statistics for Big Data (SISBID).
Introducing Matlab to UROC (Undergraduate Research Opportunities Center) students at the University of California Merced.
Introducing Python and C++ to incoming graduate students.
Introducing Matlab to UROC (Undergraduate Research Opportunities Center) students.

UNDERGRADUATE INTERNSHIPS

1. MINI-ROBOTICS | RESEARCH ASSISTANT

Jun 2014 - Aug 2014

University of Maryland - College Park, MD

- Mini-Robotics is a Research Experience for Undergraduates (REU) program funded by the National Science Foundation (NSF).
- Principal Investigators: Krishnanand Kaipa, Hugh Bruck, and Sarah Bergbreiter

2. CRAWL | RESEARCH ASSISTANT

Jun 2013 – Jun 2014

East Tennessee State University - Johnson City, TN

- The Collaborative Research on the Arthropod Way of Life (CRAWL) program was funded by the National Science Foundation (NSF grant DMS-1128954).
- Principal Investigators: Michele Joyner and Thomas Jones

3. S-STEM | RESEARCH ASSISTANT

Sept 2013 – May 2014

East Tennessee State University - Johnson City, TN

- Scholarship program for Science, Technology, Engineering and Mathematics (S-STEM) was funded by the National Science Foundation (NSF grant DUE-1356397).
- As part of the program's initial cohort, my task is to participate in statistical analysis of data for improving minority graduation and mentoring the next cohort.
- Principal Investigator: Ariel Cintron-Arias

CONFERENCE PRESENTATIONS

- 2018** SIAM Chapter Conference | Merced, CA
Joint Mathematics Meetings | San Diego, CA
Poster Title: "The Curves of Language Evolution: Quantifying 'Stable' and 'Volatile' Word Frequencies Using Data Science"
Talk Title: "An Unsupervised Machine Learning Approach for Detecting the Language of Prejudice including Micro-aggressions on Social Media"
- 2016** oSTEM National Conference | Denver, CO
Poster Title: "A Stochastic Model for Cooperative Hunting of A Sub-social Arachnid"
- 2015** ETSU Boland Symposium | Johnson City, TN
Joint Mathematics Meetings | San Antonio, TX
Talk Title: "Using Stochastic Differential Equations to Model Predation Movements of Anelosimus Studiosus"
Poster Title: "An Aggregate Stochastic Model Incorporating Individual Dynamics for Predation Movements of Anelosimus Studiosus"
- 2014** NIMBios Conference | Knoxville, TN
Mini-robotics Symposium | College Park, MD
Joint Mathematics Meetings | Baltimore, MD
Poster Title: "An Aggregate Stochastic Model Incorporating Individual Dynamics for Predation Movements of Anelosimus Studiosus"
Talk Title: "Quadrupedal Amphibious Robot Leg Design for Swimming"
Poster Title: "Expansion of a Stochastic Model for Anelosimus Studiosus Movement During Prey Capture"
Talk Title: "Expansion of a Stochastic Model for Anelosimus Studiosus Movement During Prey Capture"
- 2013** NIMBios Conference | Knoxville, TN
Talk Title: "Expansion of a Stochastic Model for Anelosimus Studiosus Movement During Prey Capture"

LEADERSHIP EXPERIENCE & EXTRACURRICULAR ACTIVITIES

NATIONAL ORGANIZATION OF GAY AND LESBIAN SCIENTISTS AND TECH. PROFESSIONALS (NOGLSTP) | MEMBER

Aug 2016 - Present | United States

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS (SIAM) | SECRETARY

Aug 2018 - Aug 2019 (Secretary), Aug 2015 - Present (Member) | Student Chapter at the University of California Merced - Merced, CA

PHILIPPINE-AMERICAN STUDENT SOCIETY | FOUNDER AND PRESIDENT

Jan 2014 - May 2015 | East Tennessee State University - Johnson City, TN

THE MATH AND STATS CLUB | MEMBER

Sept 2012 - May 2015 | East Tennessee State University - Johnson City, TN

AWARDS

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|-------------|---|--|
| 2018 | 3rd Place Poster
Graduate Student Researcher | Regional SIAM Conference
University of California Merced PI: Suzanne Sindi |
| 2017 | Summer 2017 Fellowship | Applied Mathematics - University of California Merced PI: Harish Bhat |
| 2016 | Outstanding Poster | Out in Science Technology Engineering and Mathematics (oSTEM) National Conference |
| 2015 | Cum Laude Graduate | East Tennessee State University |
| 2014 | Outstanding Presentation
S-STEM Scholarship | Mathematical Association of America Poster Session Joint Mathematics Meetings
East Tennessee State University PI: Ariel Cintron-Arias |
| 2012 | Academic Performance Schol. | East Tennessee State University |
| 2011 | Outstanding Student
Magna Cum Laude Graduate | NE State Community College
NE State Community College |