

Jacob Mashburn

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Professional Summary

Mathematics PhD from Texas A&M University, with research emphasis in Probability and proficiency in programming, machine learning, audio signal processing, and statistical analysis. Accustomed to working in a collaborative, cross-functional, fast-paced environment with peers of diverse views, and effective at distilling information and communicating results to technical and non-technical stakeholders.

Skills

- **Languages & Platforms:** Python, MATLAB, C++, SQL, Keras, TensorFlow, Pandas, Linux, Audacity
- **Data Science:** Regression, Clustering, PCA, Deep Neural Networks, Audio Processing, Audio Algorithms
- **Quantitative:** Probability, Statistics, Data Science, Machine Learning, Digital Signal Processing

Experience

Doctoral Mathematics Probability Researcher, TAMU Mathematics Department Aug 2016 to Aug 2022

- Innovated in the field of probability theory by developing a framework for operators found in quantum mechanics.
- Strong presentation skills with experts and non-experts, as evidenced by 11 invited and contributed talks.
- Collaborated with diverse teams in-person and virtually, resulting in two academic papers.

Python/MATLAB Teaching Assistant, TAMU Mathematics Department Aug 2016 to Aug 2022

- Instructed over 700 students in Python and MATLAB programming across 7 semesters with a 94% pass rate.
- Taught a mixed topics course which included statistics, graph theory, and cryptography for 4 semesters.
- Managed change during the COVID-19 pandemic by moving my Spring 2020 class online to Zoom in under a week.

MATLAB Research Assistant, TAMU Mays Business School Aug 2015 to Aug 2016

- Developed numerical simulations using MATLAB, resulting in visuals for 2 of Dr. K. Ray's economic research papers.
- Edited Dr. Ray's research papers, from draft to journal-ready version, with LaTeX, resulting in 7 journal submissions.
- Mentored 2 new employees in MATLAB and LaTeX programming and supervised their work.

Selected Projects

Audio Sample to FM Synthesis Predictor, Personal Project Jan 2023 to Feb 2023

- Designed convolutional deep neural networks with TensorFlow and Keras to generate, given an audio sample, a patch file for a Yamaha FM synthesizer to replicate it, resulting in less than 13% error in repeated cross-validation testing.
- Developed a hybrid approach to audio analytics combining digital signal processing techniques with machine learning.
- Extracted audio feature data using spectrograms, then applied rescaling and dimension reduction algorithms.

Data Visualization Challenge, Baker Hughes Oct 2022 to Oct 2022

- Collaborated with a cross-functional team of individuals with diverse backgrounds resulting in 2nd place in this challenge.
- Analyzed data from gas turbine engine emission factors to identify potential steps toward a sustainable energy model.
- Cleaned data with R, produced heatmaps using Python, then presented findings to judges.

Data Science Competition, TAMU Institute of Data Science Mar 2022 to Apr 2022

- Collaborated with a team of graduate students to produce visuals on the state of interdisciplinary research between the TAMU Mathematics, Statistics, and Computer Science departments, resulting in a finalist placing.
- Mined research article metadata using Python, then cleaned and augmented it by cross-referencing with Cornell's arXiv database, earning an additional award for Best Use of External Data.
- Produced and presented visualizations to a panel of judges including active TAMU researchers.

Leadership

Weekly Seminar Organizer, TAMU Mathematics Graduate Student Organization Aug 2019 to May 2022

- Curated each semester's schedule by inviting speakers from department faculty and graduate students.
- Managed change during the COVID-19 pandemic by moving the seminar to Zoom and resolving scheduling conflicts.

Publications

Fock representations of free convolution powers Jul 2022

M. Anshelevich, J. Mashburn arxiv.org/abs/2207.12481

Some Fock spaces with depth two action Mar 2021

M. Anshelevich, J. Mashburn arxiv.org/abs/2103.13936

Education

Texas A&M University, PhD in Mathematics Aug 2016 to Aug 2022

Texas A&M University, B.A. Mathematics Aug 2012 to May 2016