

# Trevor Olsen

Applied Scientist

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**Summary:** Double Ph.D. in Computer Science and Mathematics with 10 years of experience overall, including 3 years of hands-on industry experience in finance developing machine learning models and data-pipelines to operate at scale. In my current role, I am focused on improving price predictions and ranking comparable sales for homes across the US. I have an extensive background in academia, which includes coursework in machine learning, deep learning, statistics, linear algebra and graph theory. Additionally, I have 7 publications across robotics, discrete mathematics and statistics.

## WORK HISTORY

- **Senior Data Scientist, Freddie Mac** **08/2022 - Present**
  - **House Price Prediction Model Enhancement:**
    - Created a house price prediction deep learning model that covers 100 million properties in the US, which yielded a 2% accuracy boost compared to production in pre-defined testing regions
    - Implemented a constant time geospatial lookup algorithm to enable enhanced data engineering
    - Developed a pipeline that unified 5+ vendor data sources, which improved data coverage and runtime
  - **Comparable Sales Model:**
    - Proposed and constructed tree-based appraiser adjustment models, which are within 5% of the actual appraiser adjustment in 99% of the validation set
    - Initiated and built a comparable sales recommendation system to generate a ranking of the best comparable sales for new construction homes. This matched the performance of production models, and doubled the coverage of new construction homes, expanding the number of possible portfolio homes by 150,000 annually
  - **Team Leadership and Collaboration:**
    - Planned and organized the 2024 Q3 Hackathon to enrich the geospatial data for production models. New features provided a 1-2% boost in production price prediction models over initial testing regions
    - Selected as an officer to oversee the comparable sales model initiative
    - Won the 2023 Q1 Hackathon that involved matching school boundaries to US properties, by developing the algorithm that had the best coverage and fastest runtime
    - Developed automation scripts to assist new hires through the onboarding process
- **Lecturer, University of South Carolina** **08/2016 - 01/2022**
  - Taught 18 courses including statistics, linear algebra, multivariate calculus and advanced algorithms
  - Earned an average student evaluation score of 4.75/5
- **Adjunct Faculty, Miami Dade College** **05/2015 - 08/2016**
  - Instructed a wide range of classes including statistics, calculus and financial mathematics
  - Average student evaluation score of 4.9/5

## EDUCATION

- **Ph.D. in Computer Science, University of South Carolina** **01/2022**
  - Developed more than 5 sampling methods that reduced runtime by 90% when compared to the best know algorithm, and solved novel problems in the robotics pursuit-evasion domain. This code was implemented in C++ with additional Python scripts to automate over 5000 simulations, which resulted in 3 publications with 2 additional papers in preparation
- **Ph.D. in Mathematics, University of South Carolina** **05/2020**
  - Analyzed over a billion graph isomorphism classes and generalized structures by density-based invariants. Code was written in Python (SageMath) and resulted in 3 publications with 2 more in preparation

- **M.S. in Computer Science**, University of South Carolina **05/2021**
- **M.A. in Mathematics**, University of Miami **05/2015**
- **B.S. in Computer Science and Math**, Palm Beach Atlantic University **05/2013**
- **Coursework:** Machine Learning, Deep Learning, Advanced Statistics and Probability, Regression Analysis, Robotics, Parallel Computing, Image Processing, Linear Algebra, Graph Theory and Advanced Algorithms

## **COMPETENCIES**

- **Programming Experience** – Python (PyTorch, Scikit-learn, Tensorflow, Pandas, Numpy, Jupyter, NetworkX), SQL, C++ and R
- **Theory** – Deep Learning, Machine Learning, Large Language Models (LLM), Natural Language Processing (NLP), Graph Neural Networks, Statistics, Robotics and Linear Algebra
- **Soft Skills** – Presenting, Lifelong Learning, Overcoming Adversity, Team Leadership, Cross-Functional Collaboration and Communication
- **Personal Interests** – Video/Board Games, Foster Failure Dog Dad, Hiking, College Football, Woodworking

## **SELECTED PUBLICATIONS & PERSONAL PROJECTS**

- **Robust-by-Design Plans for Multi-Robot Pursuit-Evasion**
  - Utilized intelligent sampling method and an enhanced DFS to effectively create a plan to pursue an evader, regardless of robotic failures
  - Published in International Conference on Robotics and Automation (2022)
- **Minimum Wiener Index of Triangulations and Quadrangulations**
  - Found the structure that minimizes the Wiener Index on maximally planar graphs and a closed formula for this index as a function of the number of vertices. Results were proven to be optimal
  - Published in Discrete Applied Mathematics (2022)
- **Clinical Characteristics of Suspected COVID-19 in Pediatric Patients**
  - Conducted statistical analysis on study comparing positive and negative COVID-19 patients
  - Published in International Journal of Critical Care and Emergency Medicine (2021)
- **NCAA March Madness Bracket Predictor**
  - Assembled 20 years of data with web scraping before pre-processing
  - Predicted the correct winner with 75% accuracy using predictive models
  - Utilized a Bayesian optimizer to tune the hyper-parameters