

THOMAS ABRAHAM

Quantitative Analyst | Data Scientist | Statistical Modeling & Machine Learning
Harrisburg, PA | thomas.e.abraham@gmail.com | (717) 514-1059
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SUMMARY

Applied statistician and machine learning practitioner with a graduate background in AI/ML from Columbia and advanced mathematics coursework at Harvard. Five years building and explaining predictive models across classification, regression, time series, NLP, and computer vision, and teaching that same material to graduate students and advanced high-school students. Designed and deployed a full-stack statistics learning platform used in live classrooms. Particular strength in making quantitative results legible to people who need to act on them.

PROFESSIONAL EXPERIENCE

Bishop McDevitt High School, Harrisburg, PA

Aug 2025 - Dec 2025

Mathematics Teacher

- Taught mathematics across multiple course levels, continuing curriculum and assessment design begun at Trinity.
- Applied statistical analysis of assessment data to identify learning gaps and adjust instruction.

Trinity High School, Camp Hill, PA

Dec 2023 - Aug 2025

Mathematics Teacher - AP Statistics, Calculus, Algebra, Geometry, Trigonometry

- Designed and delivered a complete AP Statistics curriculum covering sampling distributions, inference, regression, and experimental design.
- Built and deployed a full-stack learning platform (JavaScript, D3.js, Firebase Auth, Firestore) with 30+ interactive statistical visualizations, an assessment engine, and per-student progress analytics.
- Used item-level assessment data to diagnose misconceptions and target instruction, applying the same diagnostic logic as model error analysis.
- Translated abstract probabilistic concepts into visual, interactive form for non-specialist audiences.

Varsity Tutors (Remote)

Jan 2021 - Dec 2023

Instructor - Data Science, Machine Learning, and Mathematics

- Taught applied machine learning, NLP, data engineering, Python, R, and SQL to graduate and professional students.
- Worked with students from MIT, Caltech, Columbia, Hong Kong University of Science and Technology, and the Indian Institutes of Technology, and with practitioners at J.P. Morgan Chase and Walmart.
- Covered advanced coursework including linear algebra, multivariate calculus, algorithms, operations research, computer vision, and neural networks.
- Diagnosed conceptual gaps quickly across unfamiliar problem domains and built working solutions alongside clients under time pressure.

Dalit Solidarity

Jan 2018 - Dec 2020

Director of Development

- Directed fundraising, grant writing, and revenue management for a nonprofit operating K-12 education and vocational programs in India.
- Built and maintained donor and funding data systems; reported financial and program outcomes to the board.

SELECTED TECHNICAL PROJECTS

Independent and graduate coursework projects. Full code and write-ups at teabraham.github.io.

- **AP Statistics Learning Platform** - End-to-end web application: Firebase Authentication and Firestore backend, role-based student and admin views, multiple-choice and free-response assessment engine, and 30+ D3.js simulations (Galton board, sampling distributions, confidence intervals, random variable arithmetic).
- **Power Consumption Forecasting** - LSTM models for multi-region electricity demand forecasting; benchmarked against SARIMAX baselines.
- **Sales Forecasting Pipeline** - Comparative time-series study from ARIMA through Facebook Prophet, with cross-validated error analysis.

- **Credit Risk and Loan Default Prediction** - XGBoost and Random Forest classifiers with recursive feature elimination and mutual information gain for feature selection.
- **Customer Segmentation and RFM Analysis** - K-means clustering on transaction data; second iteration using NLP keyword extraction with ensemble voting classifiers.
- **Medical Imaging Classification** - Multi-class CNN in PyTorch for COVID and pneumonia detection from chest X-rays; ResUNet architecture for brain tumor segmentation.
- **Vehicle Routing Optimization** - Travelling salesman and vehicle routing solutions using Google OR-Tools and self-organizing maps.
- **Portfolio Optimization** - TensorFlow.js and D3.js application computing Sharpe ratios and the efficient frontier interactively.
- **NLP Suite** - TextRank summarization, next-word prediction with LSTMs, keyword extraction with NLTK, and consumer complaint classification.

EDUCATION

Harvard University, Extension School, Cambridge, MA

Expected 2027

Master of Liberal Arts, Mathematics for Teaching

- Graduate coursework in advanced mathematics including calculus, linear algebra, and mathematical reasoning.

Columbia University, New York, NY

2022

Postgraduate Diploma, Machine Learning and Artificial Intelligence

- Two-year program covering supervised and unsupervised learning, deep learning, NLP, computer vision, reinforcement learning, and search.

Northwestern University

2018

Data Science Certificate Program

Temple University, Fox School of Business, Philadelphia, PA

2011

B.B.A., Business Administration - Human Resource Management

TECHNICAL SKILLS

Languages: Python, R, SQL, JavaScript, HTML/CSS, Java, C++

ML and Statistics: Scikit-learn, PyTorch, TensorFlow, Keras, XGBoost, statsmodels, regression and classification, PCA, clustering, A/B testing, time series (ARIMA, SARIMAX, Prophet, LSTM), Bayesian methods

Data and Visualization: Pandas, NumPy, D3.js, Tableau, Plotly, Matplotlib, Seaborn, GeoPandas

Specialized: NLTK, OpenCV, Google OR-Tools, TensorFlow.js

Infrastructure: Git, Firebase, PostgreSQL, MongoDB, Docker, AWS, GCP