





Daniel Berlyne, Ph.D.




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I am a mathematician, Python developer, and aspiring data scientist with 1 year of Python experience and 8 years of experience in maths research. In recent years, my research has become increasingly algorithmic and data-driven, to the point where I am more excited about writing code and analysing data than the research itself. I am excited to redirect my talents towards data science, where I believe my skills can have a valuable real-world impact.

Skills

- **Programming languages:** Python (1 year).
- **APIs and libraries:**
 - **Data analysis:** pandas, NumPy.
 - **Data visualisation:** matplotlib, Seaborn.
 - **Machine Learning (ML):** scikit-learn, SciPy, UMAP (dimensionality reduction), HDBSCAN (clustering).
 - **Natural Language Processing (NLP):** NLTK, Sentence Transformers, Gensim, BERTopic.
- **Data science:** Regression and classification models (e.g. random forest, KNN), supervised and unsupervised models, principal component analysis (PCA), dimensionality reduction (UMAP), mutual information (MI), clustering (k -means, HDBSCAN), support vector machines (SVMs), feature encoding, latent matrix factorisation (in recommender systems), L1/L2 regularisation (lasso/ridge regression), NLP (embeddings, LLMs, topic modelling).
- **Linux systems:** Command line usage, shell scripting, virtual environments.
- **Software engineering:** Version control (Git), unit testing (pytest), linting (Ruff), data serialisation (joblib).

Data science and Python projects

- **Amazon Topic Modelling:** Identifies the major topics in Amazon product reviews using NLP. [k](#) 
 - Successfully identified six clearly defined topics, separated into distinct clusters with a coherence score of 0.71.
 - Uses topic modelling (BERTopic), LLM-based sentence embedding, dimensionality reduction (UMAP), clustering (HDBSCAN), tokenisation, class-based TF-IDF, and maximal marginal relevance.
- **Favorita Sales Forecasting:** Predicts sales figures across a chain of grocery stores. [k](#) 
 - Predicted 15 days of sales figures with an error of 0.52590 (RMSLE).
 - Uses a random forest model with target encoding, autoregression, and walk-forward validation.
- **Graph Braid Splitter:** Mathematical research tool that performs algebraic computations. 
 - Implements novel algorithms developed in [my research](#) to provide the first computations of previously unknown algebraic and geometric properties of graph braid groups and configuration spaces of graphs.
 - Uses object-oriented programming (OOP), version control (Git), unit testing (pytest), and linting (Ruff).

Experience

(Jan 2024 – Feb 2024) **Data Science Bootcamp**, Moyyn

- Performed customer segmentation and created a course recommender for Moyyn's EdTech platform, GATE.
- Correctly identified customers' course preferences with 90% accuracy.
- Uses k -means clustering for segmentation and k -nearest neighbours (KNN) for recommendation.

(Sep 2021 – Sep 2023) **Heilbronn Research Fellow**, University of Bristol

- Researched mathematics, developing theorems and algorithms, publishing research papers in top journals, and writing Python programs to perform high-level abstract mathematical computations.
- Led the organisation of the international conference *Quotients of Hierarchically Hyperbolic Groups*.
- Taught the undergraduate course *Topics in Modern Geometry*.

(Aug 2016 – May 2020) **Mathematics Instructor/Curriculum Developer**, City University of New York

- Lead instructor for the undergraduate courses *Matrix Algebra* and *Calculus II*.
- Teaching assistant for the Master's course *Probability and Stochastic Processes For Finance*.
- Collaborated on design & development of a digital calculus module for the Zicklin School of Business.

Education

(Aug 2015 – Jun 2021) **Ph.D. in Mathematics**, City University of New York

- Awarded Dissertation Fellowship, University Fellowship, Doctoral Student Research Grant, GC Fellowship.

(Sep 2010 – Jun 2015) **MMath (integrated BSc and Master's) in Mathematics**, University of Warwick

- First class honours. Awarded Undergraduate Research Scholarship.
- Included courses in Java and C programming.