Zachary Raup
Data Scientist
Reading, PA

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GitHub Portfolio: zraup.github.io/Zachary-Raup/

Summary

Physics graduate with a strong foundation in machine learning and statistical analysis, supported by hands-on experience across astrophysics, healthcare, and retail. Proven ability to build, evaluate, and communicate predictive models, with a focus on scientific rigor and clarity. Adept at Python and SQL, with a deep commitment to learning and applying new tools to solve complex, real-world problems.

Education

DataCamp
Certificate: Data Scientist with Python Career Track — September 2024
Core Topics: Python Programming, Data Cleaning, Exploratory Data Analysis, Machine Learning, SQL, Git, Data Visualization

Kutztown University of Pennsylvania (KU) — Kutztown, PA
B.S. in Physics — December 2022
Overall GPA: 3.92 — Summa Cum Laude
Awards: Chambliss Student Academic Achievement Award, Roy W. Hamme Memorial Award, KURF Grant, NSF IRES Grant

Technical Skills

Programming: Python (pandas, scikit-learn, matplotlib, PyTorch), SQL, MATLAB
ML & Analysis Tools: Jupyter, Power BI, Tableau, statsmodels, Git, LaTeX
Database Systems: MySQL, PostgreSQL
Cloud Platforms: AWS (EC2, S3)
Other: Microsoft Office, GitHub, shell scripting

Experience

- **Senior Manufacturing Tech | Manufacturing Tech II | Manufacturing Tech I** — Exton, PA
  DSM - Firmenich Biomedical — March 2023 - Present
  - Programmed CNC lathe machines using G-Code to manufacture precision medical devices under GMP/cleanroom standards.
  - Maintained high standards for documentation and cross-functional team communication.

- **Undergraduate Astrophysics Researcher | KURF Grant** — Kutztown, PA
  Kutztown University — October 2021 – March 2023
  - Constructed Python programs to model transit and radial velocity data, estimating key exoplanet and binary star parameters to advance understanding of stellar systems.

- **Undergraduate Astronomy Researcher Intern | NSF IRES Grant** — Toowoomba, QLD, Australia
  University of Southern Queensland — May 2022 – August 2022
  - Analyzed photometric data from TESS and Mt Kent Observatory using Python to refines future exoplanet transit times, contributing to planetary candidate validation.

Certifications

Data Scientist Associate (DataCamp) | **Data Analyst Associate** (DataCamp) | **Python Data Associate** (DataCamp) | **SQL Associate** (DataCamp)

Projects *(Available on GitHub)*

Chest X-Ray Pneumonia Detection with Deep Learning
Built an ensemble pipeline using ResNet18, DenseNet121, and EfficientNet-B0 with transfer learning, 5-fold cross-validation, and Grad-CAM interpretability. Achieved 91% accuracy.
Skills: PyTorch, CNNs, Model Ensembling, Medical Imaging, Cross-Validation, Grad-CAM

Discovering Similar Songs Using Machine Learning
Used dimensionality reduction (t-SNE, NMF) on Spotify audio features and built a cosine-similarity recommender.
Skills: Unsupervised Learning, Recommender Systems, Plotly, pandas

Walmart Sales Prediction
Trained regression models (Random Forest, Boosted Trees) to forecast weekly sales with over 96% R^2 score.
Skills: Regression Modeling, scikit-learn, Feature Engineering

Predicting Diabetes Using Machine Learning
Developed classifiers (Logistic Regression, KNN, Random Forest, SVM) to predict diabetes using patient metrics.
Skills: Classification Modeling, ROC Curves, Feature Importance

Publications

Schulte, J., Raup, Z., et al. (2024). *Migration and Evolution of Giant ExoPlanets (MEEP) I: Nine Newly Confirmed Hot Jupiters from the TESS Mission.* arXiv:2401.05923.

Conference Presentations

- **Raup, Z** & Reed, P (2023). Follow-up Observations Toward the Confirmation of TESS Transiting Exoplanet Candidates TOI-3645, TOI- 3660, and TOI-4153. 241st American Astronomical Society. Seattle, WA
- **Raup, Z** & Reed, P (2022). Follow-up Observations of TESS Transiting Exoplanet Candidate TOI 3645.01. 42nd Central Pennsylvania Consortium Astronomers' Meeting. Gettysburg College. Gettysburg, PA