Zachary Raup

Data Scientist
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Summary

- Physics graduate with certifications in Data Science and Data Analysis, equipped with a strong foundation in building predictive models and driving data-driven insights in diverse fields, including astrophysics, medical devices, and retail.
- Proficient in Python and SQL, with extensive experience in analyzing and interpreting complex datasets, applying machine learning algorithms, and communicating results through visualizations and reports.
- Committed to continuous learning, integrating new tools and technologies to drive innovation and optimize development workflows.

Education

DataCamp — Online
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 Languages: Python (pandas, NumPy, scikit-learn, statsmodels, matplotlib, seaborn), SQL, MATLAB
Data & ML Tools: Jupyter Notebook, scikit-learn, statsmodels, ChatGPT, Power BI, Tableau, Git, LaTeX
Database Systems: MySQL, PostgreSQL
Cloud Platforms: AWS (EC2, S3)
Other: Microsoft Office Suite, version control (Git/GitHub), basic bash/shell scripting

Experience

- **Senior Manufacturing Tech** — Exton, PA
  DSM - Firmenich Biomedical — March 2023 - Present
  - Developed G-Code programs for CNC lathe machines that manufacture medical devices using GMP techniques in a 5S clean room environment.
- **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.
- **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 predict 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)*

- **Discovering Similar Songs Using Machine Learning** | **Unsupervised Learning with Spotify Data**
  Applied dimensionality reduction (t-SNE) and Non-negative Matrix Factorization (NMF) to visualize and explore musical similarity across Spotify top tracks using audio features. Developed an interactive song recommendation system based on cosine similarity.
  *Skills: Machine Learning, **Python** (scikit-learn, , Plotly, pandas), Unsupervised Learning, Data Visualization, **Recommender Systems***
- **Walmart Sales Prediction** | **Regression Modeling**
  Built and evaluated regression models (Random Forest, Boosted Tree Regression) to predict weekly retail sales using Walmart's store and economic data. Achieved 96.36% variance explained (R^2), enabling optimized inventory management and demand forecasting.
  *Skills: Machine Learning, **Python** (scikit-learn), Regression Analysis, Data Science*
- **Predicting Diabetes Using Machine Learning** | **Classification Models**
  Developed machine learning models (Logistic Regression, KNN, Random Forest, SVM) to classify diabetes status. Key insights identified glucose, BMI, DPF, and age as critical features for prediction.
  *Skills: **Machine Learning**, Python (scikit-learn), Classification Modeling, Cross-Validation*

Publications

Jack, S., Raup, Z., et al. (2024). Migration and evolution of eccentric planets (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