Yu Chen

ychen.adastra@gmail.com | 256.585.7439 | LinkedIn/yu-chen-astra | ychenxastra.github.io

EDUCATION

Doctor of Philosophy, Space Science, The Univ. of Alabama in Huntsville — June 2018 - Dec 2020
Master of Science, Space Science, The Univ. of Alabama in Huntsville — Aug 2015 - May 2018
Bachelor of Science, Atmospheric Science, Nanjing Univ. of Info. Sci. and Tech. — Sep 2011 - June 2015

WORK EXPERIENCE

CENTER FOR SPACE PLASMA AND AERONOMIC RESEARCH — Huntsville, AL
Research Scientist — Jan 2023 - present
Postdoctoral Researcher — Jan 2021 - Dec 2022

- **Analyzed** extensive high-resolution spacecraft datasets spanning over 50 years (over 50GB) and **designed** data science **algorithms** with scientific computing applications to identify and investigate typical events. **Applied time-series, statistical analyses, and case study methodologies** to derive comprehensive insights.
- Created an **open-source Python package** for typical event, enabling automated output of characteristics and graphical results, significantly **reducing users' workload** by eliminating redundant coding efforts.
- **Built** a local event **database** and conducted thorough analyses. Offered valuable **data-driven insights** for hypothesis formulation and testing, enhancing the community's understanding of the phenomenon. Managed the online database at fluxrope.info, prioritizing efficient and convenient user inquiries.
- **Visualized** data products and **summarized** findings into **20 peer-reviewed journal publications**. **Presented** key insights through oral presentations and posters at large **conferences** for **18 times**, effectively communicating complex information to both expert and non-expert audiences.
- **Led** two national research grants as **Principal Investigator**, contributed as a **Co-Investigator** to multiple projects over $2 million. **Collaborated** with scholars across institutions and **mentored** underrepresented students in the National Science Foundation (NSF)-funded undergraduate research program.

PROJECTS

PYGS: A PYTHON PACKAGE FOR FLUX ROPE ANALYSIS — Python, Numpy, Pandas, Scipy, Matplotlib

- **Optimized** the existing detection algorithm by incorporating new theoretical concepts and complex data analytics. **Migrated** separate Matlab-based techniques to Python 3, refactored and merged over 30 scripts into a **modular Python library**, substantially minimizing manual intervention in data processing workflows.
- **Implemented technical upgrades** on several modules including enhancing the cleaning of raw data, reducing both time and space complexity. **Streamlined the architecture** to boost operational efficiency, resulting in a **100x faster** in performance and significantly broadening the applicability for various analytical needs.
- Released the open-source package on GitHub, successfully met the standards and listed on the Python in Heliophysics Community website. **Provided tutoring** and comprehensive instructions to users through **detailed documentation**, and disseminated the package to the wider scientific community.

DATABASE OF SMALL-SCALE MAGNETIC FLUX ROPE — Python, MATLAB, Excel, PostgreSQL, HTML, CSS

- **Implemented detection** for large spacecraft datasets exceeding 50 GB and **designed** sophisticated filtering algorithms to sift through over 200k event candidates. Aggregated selected events into an online database.
- **Delivered product properties** via in-depth analysis like linear regression. Provided common parameters in multiple formats to **assist users** in understanding and extracting information relevant to their topics of interest.

ANALYSES OF FOOTBALL MATCHES AND PREDICTING RESULTS — Python, Pandas, Scikit-learn, Seaborn

- **Analyzed** the **Kaggle** dataset of the English Premier League (spanning over 20 years), with a special focus on Manchester United. **Visualized statistics** to uncover various factors influencing team performance.
- **Constructed machine learning pipelines** to predict match outcomes using various models such as Naive Bayes, Adaboost, and Random Forest, etc. **Assessed the optimal model** based on metrics and applicability.
- **Refined model accuracy** through advanced techniques like rolling averages, strategic feature selection, and principal component analysis (PCA). Integrated empirical findings with real-world scenarios and conducted comprehensive analyses to address the underlying causes of suboptimal model performance.

SKILLS

Programming Languages: Python, MATLAB, SQL, C/C++
Technology and Tools: GitHub, LaTeX, Jupyter Notebook, Microsoft Office