



# Zach Hafen-Saavedra

z.hafen.saavedra@gmail.com || zhafen.github.io || (303) 819-8840 || Chicago, IL ||  

## Summary

[\[click here for a work sample\]](#)

Always-growing scientist with over 10 years of experience leading efficient solution development for complex problems, including 10 years of Python experience, 8 years profiling the histories of individual entities, and 4 years using natural-language processing (NLP) to predict academic profit.

## Education

<b>The Erdős Institute</b>	2023
Data Science Certificate	Irvine, CA
<b>Northwestern University</b>	2020
PhD, MS, Physics and Astronomy	Evanston, IL
Specialization: Astrophysical Data Analysis	
<b>University of Northern Colorado</b>	2014
BS, Mathematical Physics	Greeley, CO

## Experience

<b>Far Horizons Data Scientist</b>	September 2023 - Present
Adler Planetarium	Chicago, IL

- Utilized industry-standard tools including Docker, AWS CodeBuild, Amazon ECR, Amazon S3, and PostgreSQL to [deploy an end-to-end data analytics pipeline on AWS](#), enabling non-technical stakeholders to ingest, process, and export 100s of GB of data via a user-friendly web interface.
- Developed a [Python-centric computer-vision pipeline](#) to automate the process of aligning nighttime aerial images (only localized to within 5 km) with daytime images, dramatically increasing the alignment rate from 4 images/hour to 5000 images/hour.
- Developed [documentation, an intuitive user interface, a suite of 40+ code tests, and a stable, containerized computing environment](#), preparing for 3 years of minimal-maintenance use by stakeholders.
- Directed the adoption of [Agile project management for museum volunteers](#), seamlessly integrating the workflow for DevOps volunteers, mechanical-engineer volunteers, and Adler staff.
- As a museum resident scientist, [educated and collaborated with non-technical educators](#) to deliver life-changing deep-impact programs for 20+ high-school students and 4 interns.

<b>Business Data Analyst</b>	June 2023 - September 2023
Northwestern University, Center for Interdisc. Explor. and Research in Astrophysics	Evanston, IL

- Updated staff workflow to [ingest financial data sourced from Cognos BI](#), restoring secure access to crucial financial information.
- Created a secure, [web-based business-intelligence dashboard using Streamlit](#), enabling business staff to analyze data and present updated, tailored visualizations to stakeholders.
- Implemented a [low-dependency shell-scripting+Python solution stack](#) tailored to organization resources, guaranteeing operational continuity and maintainability of solutions.
- Automated PDF text mining and identified key data-centric insights, [empowering stakeholders to form a six-point evidence-based action plan](#) for improving diversity, equity, and inclusion.

<b>McCue Prize Postdoctoral Fellow in Cosmology</b>	July 2020 - June 2023
University of California-Irvine, Department of Physics and Astronomy	Irvine, CA

- Developed a [Python-frontend, C++-backend NLP data pipeline](#) to perform embeddings of scientific text (e.g. Word2Vec), and identified clustering-related metrics correlated with a 150% increase in academic profit (i.e. citations).

- Utilized ML tools (inc. sklearn, PyTorch) to construct an [ensemble voting model for paper impact](#) as measured by number of citations, with a validation root-mean-square error  $2/3\times$  of the baseline error.
- [Automated data retrieval from NASA APIs](#), extracting abstracts, references, citations, etc. for 1M+ papers and generating a collaborator-ready vector database.
- Orchestrated a mock data challenge spanning nine international institutions, [quantifying parameters for statistical models to attain 90%+ accuracy](#) in estimating the chemical composition of intergalactic gas, subsequently informing technical stakeholders' modeling decisions.
- Incorporated [a new data source into an open-source Git repository](#), decreasing mean parameter-estimation error by up to half.
- Led and organized a workshop of twenty key galaxy-community leaders, [fostering cross-specialty dialogue to discern high-value research targets](#) and leading to the development and completion of 3+ projects.
- Built [an end-to-end workflow linking three disparate sources of structured and semi-structured data](#) (black hole, star cluster, and galaxy simulations) and predicting focus areas for stakeholders in adjacent disciplines (gravitational wave astrophysics).

**National Science Foundation Graduate Fellow in K-12 Education**  
Northwestern University, Department of Physics and Astronomy

June 2014 - July 2020  
Evanston, IL

- Used remote high-performance-computing resources to [apply probabilistic and exact matching to 20+ TB of relational data](#), reducing to 50 GB of event-tracking data and isolating parameters stakeholders could use to predict future behavior with 99%+ certainty.
- Performed [time-series decision-tree classification](#) to predict the cosmic origins of the atoms we are made of, delivering concrete, clear, and testable hypotheses to guide collaborators.
- Employed software-development best practices such as [version control, code review, testing, and continuous integration](#) to develop 13+ open-source packages and contribute to 6 more.
- Responsibly [used remote resources to operate 100,000-CPU-hour simulations](#), generating vector databases used by 30+ stakeholders to increase statistical power and realism.
- Crafted [award-winning visualizations displayed throughout Chicago libraries and museums](#)—including the Museum of Science and Industry—advertising the beauty of science to a wide audience.
- Partnered with the Northwestern Academy for Chicago Public Schools to [pioneer a high-school data-science education program](#), reaching over 100 underrepresented students from across Chicago.
- [Founded the Physics Graduate Student Council](#) to improve student life, retention, and recruitment, tied to a nearly 200% increase in student recruitment.
- Collaborated with 100+ researchers, leading to [36 published papers, 7 as lead author](#).

**Other**

June 2023 - Present

- Trained a [convolutional neural network to perform sentiment analysis](#) of cat meows (i.e. time-series audio data), achieving 90% validation accuracy and earning a merit in the Erdős Data Science program.
- [Mentored a UCI computational-linguistics PhD student](#), leading to a presentation at AI4Science on our ongoing NLP academic-profit work and the imminent completion of our related paper.

## Skills

**Techniques:** data analysis (inc. cleaning, visualization, warehousing), machine learning (inc. NLP), statistics, containerization, dashboarding, code testing/CI, GIS (inc. image registration), computer vision

**Interpersonal skills:** technical leadership and management, storytelling, mentoring

**Tools:** Python (inc. pandas, scikit-learn, pytorch), PostgreSQL, Docker, AWS (inc. S3, EC2, CloudFormation), BI (Cognos BI, Streamlit), NoSQL, parallel computing, git, C/C++, GDAL, OpenCV, Windows/Mac/Unix