Aayushi Verma

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As an M.S. in Data Science and prospective Ph.D. in Computer Science student, I'm passionate about applying data science methods to complex research challenges. Combining my astronomy background and professional experience, I aim to contribute innovative insights to the intersection of data science and applied computer science research.

Research interests: applications of data science, machine learning algorithms, deep neural networks, information architecture, scientific computing

Education

Master of Science in Data Science — May 2022 – Dec. 2023
Pace University — *Online Program*

Bachelor of Science (Honours) in Astronomy, Minor in Mathematics — Feb. 2018 – Nov. 2021
University of Canterbury — *Christchurch, New Zealand*

Study Abroad Program – Fall Semester 2019 — Sep. 2019 – Dec. 2019
Queen's University — *Kingston, Canada*

Work Experience

Data Science Fellow — Jul. 2022 – current
Institute for Defense Analyses — *Alexandria, VA*

- Primarily working on the formulation and execution of the organizational Data Strategy, and have implemented solutions to elevate the company's information architecture.
- Contributed to a Department of Defense-sponsored project by architecting a data pipeline and facilitating seamless data ingestion to facilitate analyses.
- Authored one internal report and three internal memoranda.
- Regularly present at department seminars and conferences, and founder/leader of a Data Science Reading Group at the company to promote an academically-focused approach to data science.

Data Scientist — Mar. 2022 – Jul. 2022
SmartGreen Solar — *Providence, RI*

- Created data pipelines to ingest data from various sources and platforms, and created a MySQL database to continuously integrate the streams of data. Created executive dashboards in Google Data Studio with data from the database, to visualize sales data and salesperson performance. Created company GitHub repository to store all data cleaning scripts, and to promote data collaboration culture in the company.

Python Programmer — Apr. 2021 – Jun. 2022
CallCruncher, Inc. — *United States (Remote)*

- Developed numerous Python-based scripts and workflows to quantify daily call detail records for clients. Key skills include ingesting, cleaning and wrangling raw data, and generating statistics for data, such as computing agents' performance time for total calls in the day, reporting outliers outside 1-SD, ranking agents based on presence data and abandoned calls count, and other KPI metrics.

Research Projects and Internships

MS Data Science - Final Capstone Project — Sep. 2023 – Dec. 2023
Pace University — *Online Program*

- Developing binary classification models to answer the research question 'Can we predict the employment sector (academia vs. industry) of Ph.D. degree holders and identify the key characteristics influencing this career choice?'.
- Working with large IPUMS Higher Education survey dataset, comprising of 531,216 rows and 126 columns. Performed extensive exploratory data analysis in addition to feature reduction techniques, in conjunction with thorough literature survey to reduce data.

- Currently in process of applying machine learning algorithms like decision tree, support vector machines, and XGBoost to predict the results, evaluate the model performances, and perform hyperparameter tuning to achieve best performance.
- Aiming to publish research paper based on findings.

Senior Thesis Research Project Feb. 2021 – Nov. 2021

University of Canterbury *Christchurch, New Zealand*

- Developed 3 pipeline scripts and 2 function repositories to ingest, transform, analyze and visualize image datasets (400GB+) from an astronomy observatory, using Python and Shell.
- Developed analytics, such as plots and analysis logs for pipeline scripts, additional feature includes API for web querying of database.
- Unit-tested code, open-source and publicly available on Github.
- These pipelines are currently being used by Mt. John Observatory for processing image datasets.

Undergraduate Research Project Aug. 2020 – Feb. 2021

University of Canterbury *Christchurch, New Zealand*

- Developed Python code for querying and retrieving data about a comet from a web database and local CSV files, and analyzing and visualizing the data to produce a joined table and plots, utilizing Astropy, Numpy, Pandas and Matplotlib libraries.
- Developed Python code for querying and retrieving an astronomical target's visibility information from a web database, and outputting results as plots, using Numpy and Astropy libraries.

Laureate Internship Jan. 2020 – Feb. 2020

Research School for Astronomy and Astrophysics, Australian National University *Canberra, Australia*

- Developed multiple Python scripts for analyzing 3-dimensional data cubes of galaxies, including data cleaning, wrangling, analysis, and visualization.
- Performed operations like ASCII file manipulation, linear interpolation of data, polynomial curve fitting, and other mathematical transformations using Numpy.
- Contributed frequently to private group repository, wrote and maintained multiple function and class scripts in the repository.
- Publication for this project is currently in review in Astrophysical Journal (Mar. 2022).

Research Project Oct. 2019 – Dec. 2019

Queen's University *Kingston, Canada*

- Developed Python code for querying and retrieving data about a young star's formation (astronomy) from multiple web databases, and analyzing and visualizing the data to learn more about the young star, utilizing Numpy, Pandas and Matplotlib.

Research Project Nov. 2018 – Feb. 2019

Brown University *Providence, RI, USA*

- Developed Python code and Bash shell scripts for analyzing datasets of dark matter around galaxy clusters.

Undergraduate Research Project Jul. 2018 – May 2019

University of Canterbury *Christchurch, New Zealand*

- Developed Python code for processing and analyzing astronomical image datasets.

Publications And Other Works

Peer-Reviewed Journal Publications

- **Verma, A**. (2023). I-TREE: A Tool for Characterizing Research Taxonomies. *ITEA*, 44(3).
- Lister, T., Kelley, M. S. P., Holt, C. E., Hsieh, H. H., Bannister, M. T., Bodewits, D., Knight, M. M., Bauer, J., Chatelain, J., Dobson, M. M., Fernandez-Valenzuela, E., Gardener, D., Gyuk, G., Hammergren, M., Huynh, K., Jehin, E., Moulane, Y., Kokotanekova, R., Lilly, E., Man-To, H., McKay, A., Opitom, C., Protopapa, S., Schambeau, C., Schwamb, M. E., Snodgrass, C., Usher, H., **Verma, A.A.**, Wierzchos, K., Yanamandra-Fisher, P. A., Ye, Q., Gomez, E., Greenstreet, S. (2022). The LCO Outbursting Objects Key Project: Overview and Year 1 Status. *PSJ*. Manuscript submitted for publication.
- Grasha, K., Chen, Q.H., Battisti, A.J., Ridolfo, S., Poehler, E., Mably, S., **Verma, A.A.**, Hayward, K.L., Kharbanda, A., Acharyya, A., Poetrodjojo, H., Seibert, M., Rich, J.A., Madore, B.F., and Kewley, L.J. (2022). Metallicity, ionization parameter, and pressure variations of HII regions in the TYPHOON spiral galaxies. *ApJ*. Manuscript submitted for publication.

- **Verma, A.** (2019). The Morphology of Galaxies. *Southern Stars, 58*(2), 7–10.

Internal Reports

- **Verma, A**. (2023). Office Occupancy Dashboard. Internally-published memorandum.
- **Verma, A**. (2023). I-TREE: A tool for characterizing IDA research taxonomies. Internally-published memorandum.
- **Verma, A.** & Lane, Z. (2022). B&C 0.61-metre telescope procedure checklist. Internally-distributed report.
- **Verma, A.**, Gunn, F., Bannister, M., Tristram, P., et al. (2021). 1.8-m telescope user manual. Internally-distributed report.
- **Verma, A.** (2019). Celestron telescope manual. Internally-distributed report.

Teaching and Mentoring Experience

Mentor Mar. 2023 – current
Institute for Defense Analyses

- Mentor for junior members of team. In charge of helping them when they start working in the team, helping them with resources, and answering their questions.

Internship Supervisor Nov. 2021 - Feb. 2022
University of Canterbury Mt. John Observatory

- Supervisor for 3 undergraduate student interns and 1 graduate student at the Mt. John Observatory. In charge of training them on 2 telescopes, aiding them with their observations, mentoring them, and answering questions related to their astronomy research projects.

Teaching Assistant and Tutor Feb. 2021 - Nov. 2021
University of Canterbury

- TA for approximately 30 first-year and 30 second-year Astronomy students. In charge of holding tutorial sessions to familiarize students with class content, helping and answering questions, marking assignments, helping the lecturer with class demonstrations and extra marking, and monitoring the online class forum to answer student questions.

Astronomy Camp Assistant Apr. 2021
University of Canterbury

- RA for 'Elaine P Snowden Astronomy Camp'. In charge of 20 high school students and duties including: assisting with the running of the camp, planning activities for students, showing them around the university and telescopes at Mt John Observatory, taking them to their lectures, and engaging them with astrophysics.

Conference Presentations and Posters

Connecting Our Researchers with R and Shiny Oct. 2023
R for Government Conference *Washington, D.C.*
Invited to present a talk at this conference.

I-TREE: a Tool for Characterizing Research Using Taxonomies Apr. 2023
DATAWorks Conference *Alexandria, VA*
Presented talk and poster at this conference.

ASTEROID: A Data Reduction Pipeline for the MOA Telescope (Poster) Jul. 2021
Royal Astronomical Society of New Zealand Annual Conference 2021 *Wellington, New Zealand*

Characterizing The Activity Of New Comets Observed In The LOOK Project Jul. 2021
Royal Astronomical Society of New Zealand Annual Conference 2021 *Wellington, New Zealand*

Regular Contributor Nov. 2020 - Dec. 2021
University of Canterbury Planetary Sciences Journal Club *Christchurch, New Zealand*

Galaxy Morphology and Classification May 2019
Royal Astronomical Society of New Zealand Annual Conference 2019 *New Plymouth, New Zealand*

Extracurricular Leadership Experience and Service

Founder Aug. 2023 – current

IDA Data Science Reading Group *Institute for Defense Analyses*

- Founded this group to facilitate a more academic view of data science by discussing journal articles in a round-table format, while encouraging participation from all members, whether junior analysts or seasoned researchers.

Co-Founder Apr. 2023 – current

Women In GovTech

- Co-founded this online community to create a space for young professional women working in the Government and Tech (GovTech) industry, like myself, to share our experiences and opportunities, to network, and to support each other.

Creative Team Lead Mar. 2023 – Dec. 2023

Pace University Data Science Club

- In charge of leading Creative team, writing technical data science blog articles, and writing social media and event posts.

Social Media Manager Mar. 2020 – Nov. 2020

New Zealand Students' Space Association at University of Canterbury

- In charge of managing social media presence of association on Facebook, Instagram, YouTube, Discord, LinkedIn, etc., promoting events, networking, creating and sending monthly newsletters, and other related duties.

President and Co-Founder Dec. 2018 – Mar. 2020

New Zealand Students' Space Association: Christchurch Branch

- In charge of managing 10-person team, coordinating meeting minutes, organizing weekly tasks for team, managing and running events for association, networking to make connections for association, and other management duties.

Class Representative Jul. 2018 – Jun. 2019

University of Canterbury

- Elected as class representative for 4 courses. Responsibilities included: acting as the first point of contact for peers, helping resolve class issues, and communicating between the lecturer of the course and the students.

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last updated: Nov. 2023