# Aayushi Verma iD

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I'm passionate about applying computer vision methods to solve complex research challenges, leveraging my astronomy and data science backgrounds to contribute innovative and interdisciplinary insights.
**Professional Interests:** image processing, computer vision, machine learning security, scientific computing, data management and governance, software engineering and development.

## EDUCATION

**Doctor of Philosophy in Computer Science and Engineering**　　Aug. 2024 – current
*University of Connecticut*　　*Storrs, CT*
- Advisor: Dr. Benjamin Fuller.
- Research area: applied computer vision and security.

**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*

## PEER-REVIEWED ACADEMIC PUBLICATIONS

**2025**　　Mahmood, K., Manicke, C., Rathbun, E., **Verma, A.**, Ahmad, S., Stamatakis, N., Michel, L., Fuller, B. *Busting the Ballot: Voting Meets Adversarial Machine Learning. CCS.*

**2024**　　**Verma, A.**, Khan, O. K. *From Text to Metadata: Automated Tagging Using Python and NLP Technqiues. ITEA*, 45(3).

**2023**　　**Verma, A.** *I-TREE: A Tool for Characterizing Research Taxonomies. ITEA*, 44(3).

**2022**　　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. *The LCO Outbursting Objects Key Project: Overview and Year 1 Status. PSJ*, 3(7).

**2022**　　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. *Metallicity, ionization parameter, and pressure variations of HII regions in the TYPHOON spiral galaxies. ApJ*, 929(2).

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

## KEY RESEARCH PROJECTS AND INTERNSHIPS

**Busting the Ballot - Voting Meets Adversarial Machine Learning**　　Aug. 2024 – current
*UConn/Voter Center*　　*Storrs, CT*
- Core PhD research project to investigate security risks (adversarial attacks) in machine learning classifiers on voting ballot marks.
- Implemented binary image classifiers (SVM, SimpleCNN, ResNet-50, ConvNeXt, vision transformers) on voting bubbles dataset, and implemented adversarial attacks on trained models.
- Developed data pipeline for training models, based on pre-existing data and synthetically-generated data. Developed a new second version of dataset.
- Developing methodology to extend physical-world explainable and adversarial machine learning.
- Co-authored paper (Mahmood et al., 2025) accepted at CCS 2025.

### Anomaly Detection Research Project
*UConn/National Institute for Underwater Vehicle Technology*

Jul. 2024 – current

*Storrs, CT*

- Implementing various approaches for anomaly detection in time series network traffic data.

### Biometrics Project
*UConn/Dapple*

Aug. 2024 – Feb. 2025

*Storrs, CT*

- Funded research project (private-sector biometrics authentication startup) for developing cryptographically-secure authentication of biometrics (fingerprints, iris, face).
- Implemented modified U-Net autoencoder to train multiple fingerprint datasets and extract encoders to pass on to cryptography collaborators.
- Developed Dirichlet Wave Transform modules to integrate with the U-Net for fingerprint reconstruction.

### MS Data Science - Final Capstone Project
*Pace University*

Sep. 2023 – Dec. 2023

*Online Program*

- Employed binary machine learning models to predict the employment sector (academia vs. industry) of Ph.D. degree holders.
- Utilized highly-dimensional longitudinal IPUMS Higher Education survey dataset, conducted extensive exploratory data analysis, and applied feature reduction techniques.
- Employed machine learning algorithms (e.g., decision tree, gradient boosting, XGBoost) for prediction, performance evaluation, feature importance extraction, and hyperparameter tuning.

### Undergraduate Honours Thesis
*University of Canterbury*

Feb. 2021 – Nov. 2021

*Christchurch, New Zealand*

- Developed codebase to ingest, transform, analyze and visualize image datasets (400GB+) from an astronomy observatory.
- These pipelines have been adapted by Mt. John Observatory for processing image datasets.
- Wrote Section 4.1 of research paper Lister et al., 2022, based on my research results.

### Laureate Internship
*Research School for Astronomy and Astrophysics, Australian National University*

Jan. 2020 – Feb. 2020

*Canberra, Australia*

- Developed codebase for analyzing 3-dimensional data cubes of galaxies, including data cleaning, wrangling, analysis, and visualization.
- Co-authored publication based on research results (Grasha et al., 2022).

## WORK EXPERIENCE

### Data Science Fellow
*Institute for Defense Analyses*

Jul. 2022 – Jul. 2024

*Alexandria, VA*

- Primarily part of company's Data Strategy team. Designed and implemented numerous data science solutions to enhance research operations, including data curation pipelines, dashboards, and NLP pipelines. Actively contributed to data management and governance initiatives as part of Data Strategy.
- Contributed to Department of Defense-sponsored projects by developing data pipelines to perform analyses.
- Developed framework for Department of State organization to improve their recruiting and hiring processes.
- Contributed to a Human Capital research project by web-scraping Reddit posts, organizing and structuring the data, and feeding text corpus to LLM using RAG method to perform topic modeling.
- Regularly presented 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
*SmartGreen Solar*

Mar. 2022 – Jul. 2022

*Providence, RI*

- Built data pipelines to integrate with database, and created executive dashboards for quantifying sales insights. Established a company GitHub repository to centralize data pipelines, promoting collaboration.

### Python Programmer
*CallCruncher, Inc.*

Apr. 2021 – Jun. 2022

*United States (Remote)*

- Developed pipelines for analyzing daily call records, agent performance, identifying outliers, and tracking KPI metrics.

## Scholarships and Fellowships

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| **Synchrony Fellowship Fall 2025** | 2025 |
| *UConn - Connecticut Advanced Computing Center* | *Fellowship* |
| **UConn School of Computing Graduate Fellowship 2024-2025** | 2024 |
| *UConn Department of Computer Science and Engineering* | *Fellowship* |
| **Graduate Merit Scholarship** | 2022-2023 |
| *Pace University Seidenberg School of Computer Science and Information Systems* | *Tuition Assistance* |
| **Summer Research Scholarship** | 2020-2021 |
| *University of Canterbury School of Physical and Chemical Sciences* | *Scholarship* |
| **UC Excellence Scholarship** | 2018 |
| *University of Canterbury* | *Scholarship* |

## Awards and Honors

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|---|---|
| **Pre-Doctoral Honorable Mention** | May 2025 |
| *UConn Department of Computer Science* | *(Award)* |
| **Outstanding Achievement & Commitment to Leadership Excellence Award** | May 2025 |
| *UConn College of Engineering - John Lof Leadership Academy (JLLA)* | *(Award)* |
| **Department Winner - College of Engineering Annual Poster Competition** | Mar. 2025 |
| *UConn College of Engineering* | *(Award)* |
| **Notable Mention in IDA Larry D. Welch Award** | Jun. 2024 |
| *Institute for Defense Analyses* | *(Honor)* |
| **1st Place in IDA Data Visualization Contest** | Jan. 2024 |
| *Institute for Defense Analyses* | *(Honor)* |
| **4th Place in Visco Prize Competition** | Dec. 2023 |
| *Military Operations Research Society* | *(Honor)* |
| **3rd Place in 2022 Lubin School - Dataiku Hackathon** | Nov. 2022 |
| *Pace University Seidenberg School of Computer Science and Information Systems* | *(Honor)* |
| **RASNZ Presidents' Award for Best Presentation: First Prize** | May 2019 |
| *Royal Astronomical Society of New Zealand* | *(Award)* |

## Academic Service

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| **2025** | Peer Reviewer (invited), Synthetic and Adversarial Forensics (SAFE) Workshop (co-located with WACV 2026). |

## Teaching and Mentoring Experience

**Instructor** — Mar. 2025 – current
*University of Connecticut/NTIA Techbridge Program*
- Instructor and TA for NTIA TechBridge program for underserved high school students in the Hartford area. Prepare and teach content on introductory programming in Python. Supervise undergraduate TAs on team.

**Mentor** — Oct. 2024 – current
*University of Connecticut*
- Mentor for 2 junior members of team for Busting the Ballot research project. In charge of helping them when they started working in the team, helping them with resources, and answering their questions, in addition to designing experiments for them to contribute to research.

**Mentor** — Mar. 2023 – Jul. 2024
*Institute for Defense Analyses*
- Mentor for junior members of team. In charge of helping them when they started 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** <span style="float:right">Feb. 2021 - Nov. 2021</span>

*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.

## CONFERENCE PRESENTATIONS AND POSTERS

**Busting the Paper Ballot: Voting Meets Adversarial Machine Learning** <span style="float:right">Oct. 2025</span>

*ACM CCS* <span style="float:right">*Taipei, Taiwan*</span>

- Paper accepted at this conference. Presented talk.

**From Text to Metadata: Automated Tagging Using Python and NLP Techniques** <span style="float:right">Apr. 2024</span>

*DATAWorks Conference* <span style="float:right">*Alexandria, VA*</span>

- Abstract accepted to present at this conference. Presented talk and poster.

**From Data to Collaboration: Connecting Our Researchers with Data Science** <span style="float:right">Dec. 2023</span>

*MORS Emerging Techniques Forum* <span style="float:right">*Laurel, MD*</span>

- Abstract accepted to present at this conference. Won 4th place in Visco Prize Competition for presentation.

**Connecting Our Researchers with R and Shiny** <span style="float:right">Oct. 2023</span>

*R for Government Conference* <span style="float:right">*Washington, D.C.*</span>

- Invited to present a talk at this conference.

**I-TREE: a Tool for Characterizing Research Using Taxonomies** <span style="float:right">Apr. 2023</span>

*DATAWorks Conference* <span style="float:right">*Alexandria, VA*</span>

- Presented talk and poster at this conference.

**ASTEROID: A Data Reduction Pipeline for the MOA Telescope** (**Poster**) <span style="float:right">Jul. 2021</span>

*Royal Astronomical Society of New Zealand Annual Conference 2021* <span style="float:right">*Wellington, New Zealand*</span>

- Presented talk and poster at this conference.

**Characterizing The Activity Of New Comets Observed In The LOOK Project** <span style="float:right">Jul. 2021</span>

*Royal Astronomical Society of New Zealand Annual Conference 2021* <span style="float:right">*Wellington, New Zealand*</span>

- Presented talk and poster at this conference.

**Galaxy Morphology and Classification** <span style="float:right">May 2019</span>

*Royal Astronomical Society of New Zealand Annual Conference 2019* <span style="float:right">*New Plymouth, New Zealand*</span>

- Presented talk and poster at this conference.

## EXTRACURRICULAR LEADERSHIP EXPERIENCE AND PROFESSIONAL SERVICE

**Chair** <span style="float:right">Jun. 2025 – current</span>

*CSE GradLife Committee* <span style="float:right">*University of Connecticut*</span>

- Serving on GradLife Committee in my department to improve graduate student life. Planned and executed several initiatives since joining to foster a stronger sense of community amongst computer science graduate students in my department.

**Member Co-Finance Director** <span style="float:right">Oct. 2024 – Oct. 2026</span>

*UConn John Lof Leadership Academy* <span style="float:right">*University of Connecticut*</span>

- Selected as a John Lof Scholar to develop leadership and professional skills by organizing professional development workshops, and engaging with internal and external communities to provide mentoring and support for graduate students in the UConn College of Engineering.
- Spearheading and leading Outreach Committee to design framework for broader interaction with College of Engineering, UConn, and the general public.
- Serving as co-Finance Director on 2025-2026 Executive Board.

**Founder**                                                    Aug. 2023 – Jul. 2024

*Institute for Defense Analyses - Data Science Reading Group*          *Institute for Defense Analyses*

- Founded this group at my workplace 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*                                                      *Online Community*

- 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.

## COMMUNITY OUTREACH AND ENGAGEMENT

**Poster Presenter and Department Winner**                         Mar. 2025

*UConn College of Engineering Annual Poster Competition*             *(volunteered)*

- Presented poster on my PhD research, and prepared 3-minute pitch. Engaged with other UConn College of Engineering peers and faculty, and judges from industry, to share my research. Won department prize for Computer Science at this competition.

**Poster Presenter**                                               Oct. 2024

*UConn Research Connections*                                         *(volunteered)*

- Presented a poster at the UConn Research Connections event to connect with first and second year undergraduates to showcase my PhD research and demonstrate UConn's excellent R1 research culture.

**Note on Pre-Doctoral Outreach**                                  2018 – 2024

*Multiple institutions*                                              *(volunteered)*

- For brevity purposes, I have omitted here all pre-PhD community outreach/engagement activities. However, I have been consistent with volunteering for many community outreach activities throughout my Bachelor's in Astronomy at the University of Canterbury from 2018 - 2022, throughout my Master's in Data Science at Pace University from 2022 - 2024, and throughout my role as Data Science Fellow at the Institute for Defense Analyses from 2022 - 2024. Community service is something I strongly believe in.

*last updated: Dec. 2025*