Suhas Cristy Mathey

I completed my master's in electrical & computer engineering with a strong focus on Data Science, Signal Processing, and Machine Learning. My MS research involved developing Machine Learning algorithms for artwork analysis

Email website ms-cristy Cristy210 Google Scholar

Education

Master of Science in Electrical & Computer Engineering | *GPA: 3.67/4.0* Feb 2025
University of Delaware | *Newark, DE*
Thesis: *Hyperspectral Image Analysis via Subspace Clustering*

Bachelor of Technology in Electronics & Communication Engineering | *GPA: 7.21/10.0* May 2021
Indian Institute of Information Technology, Tiruchirappalli | *India*

Experience

Graduate Research Assistant Feb 2024 – May 2025
University of Delaware - Electrical & Computer Engineering Newark, DE, US

- Worked on an inter-disciplinary project in Hyperspectral Image Analysis using **Unsupervised Learning** techniques.
- Utilized matrix decomposition techniques from linear algebra to handle high-dimensional image data, transforming it into lower-dimensional subspaces for efficient **Image analysis & Processing**.
- Developed and implemented **machine learning algorithms** in Julia to cluster and analyze hyperspectral image datasets using unsupervised learning methods.
- **Presented** research findings through weekly lab meetings using data visualizations created using **CairoMakie**, focusing on clear and actionable insights from hyperspectral data analysis.
- Utilized **GitHub** for version control and continuous integration, managing branching strategies, and ensuring efficient collaboration with the research team for end-to-end development workflow management.
- Co-developed a Julia Software Package, ***SubspaceClustering.jl***, which implements various subspace-based clustering algorithms for efficient analysis of high-dimensional data.

Computational Researcher Jan 2024 – Feb 2024
University of Delaware - Chemical Engineering Newark, DE, US

- Implemented algorithms in **Python** for advanced numerical computations and used CuPy to leverage GPU acceleration.
- **Developed** synthetic datasets using **Pandas**, enhancing ML models for accurate prediction of atomic scattering patterns.
- Engineered parallel processing solutions via **Thread Pool Executors** for computational efficiency.

Senior Multimedia Student Assistant Sept 2023 – Jan 2024
University of Delaware - Library, Museum & Press Newark, DE, US

- Led a team of 8 student assistants, helping faculty and students address their multimedia needs.
- Worked with individuals from different backgrounds, ensuring smooth communication and use of multimedia services.
- Awarded the ***2024 Library Student Assistant Scholarship award*** in recognition of my work and demonstrated leadership potential.

Assistant System Engineer Mar 2022 – Dec 2022
TATA Consultancy Services Chennai, IN

- Dealt with vulnerability assessment checks for the Citi Corp's networks and applications.
- Collaborated with a **global** team of 50 in consolidating client's applications security.
- Developed data sheets using advanced **Excel** tools to present data and communicate insights to the **clients**.

Projects

MS Research: Pigment Mapping in RIS Datasets via Subspace Clustering
Language: Julia

- **Developed and optimized** clustering algorithms in Julia and Python for pigment mapping, to enhance clustering performance and accuracy in hyperspectral **Reflectance Imaging Spectroscopy (RIS)** datasets.
- Achieved over **95% accuracy** in clustering results through the development and optimization of machine learning algorithms for spectral signature-based pigment identification in hyperspectral imaging datasets.
- Results from this project have been accepted for a keynote talk at **Techno Heritage 2024** and for poster presentation at **2024 IEEE Baltimore Technical Colloquium**, underlining the contribution to technical innovation in the field of Machine Learning and Signal Processing.

Feature Engineering with Analytical Data – Dow Chemical (Spring 24)
Language: Python

- Implemented **regression models** to analyze spectroscopy datasets of different materials provided by **Dow Chemical**.
- Employed **peak finding** function from the **SciPy library** to accurately detect and pre-process key **spectral features**, improving the precision of data analysis.
- Implemented pre-processing strategies like **normalization** and **dimensionality reduction** to enhance the integrity of the data by minimizing noise and variability amongst the features.
- Leveraged **NumPy** and **SQL** for efficient data manipulation, **querying**, and **analysis** of large spectroscopy datasets, enabling seamless data extraction, pre-processing, and feature selection for **regression analysis**.
- Utilized statistical models, specifically linear regression, to link analytical data with polymer performance, establishing quantitative feature-performance relationships.
- Applied **PCA** to reduce dimensionality and for **feature selection**, simplifying complex high-dimensional data and enabling clearer insights into material behavior.
- Leveraged **Matplotlib** for advanced data visualization techniques, utilized **scree plots** for dimensionality reduction analysis and **parity plots** to evaluate model accuracy.

Biomolecular Identification Algorithm for Mass Spectrometry
Langauge: Julia

- Investigated **bio-informatics** methods for identifying several biological targets with minimal spectrum pre-processing needed.
- Implemented and compared **clustering algorithms**, including **K-Means**, **Spectral Clustering**, and **K-Subspaces Models**, to enhance the identification and classification of biological targets.
- Designed a robust pipeline for data **pre-processing**, **dimensionality reduction**, and clustering, optimizing the algorithm's accuracy and performance on bio-informatics datasets.
- Validated the algorithm's effectiveness on diverse datasets, demonstrating its adaptability and reliability in identifying bio-molecular targets across varying experimental conditions.

Hyperspectral Image Analysis - Unsupervised Learning
Language: Python, Julia

- Implemented clustering algorithms, including K-Means, Spectral Clustering, and K-Subspaces Clustering, for hyperspectral image analysis.
- Analyzed and classified hyperspectral datasets such as **Pavia, Salinas, Indian Pines, and Onera Satellite**, focusing on **spectral** and **spatial** feature clustering.
- Optimized clustering techniques to enhance accuracy in segmenting **high-dimensional** hyperspectral data.
- Developed scalable workflows to process and visualize results, aiding in comprehensive analysis and actionable insights from **hyperspectral imagery**.

Presentations & Talks

Udel GECE Hour – Graduate Student Seminar (Talk) Nov 1, 2024
Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering

2024 IEEE Baltimore Technical Colloquium Conference (Poster Session & Lightning Talk) Nov 2, 2024
Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering

Delaware Data Science & Darwin Computing Symposium (Poster Session & Lightning Talk) Feb 13, 2025
Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering

Community Service

Hope Worldwide Ltd

- Active volunteer in Hope Worldwide since freshman year in college
- Organized a volunteer event to renovate Hope Worldwide orphanage in Tiruchirapalli, India with 200+ participants.
- Organized a clean-up with about 50 people from the locality at White Clay Creek Park in Newark, DE

Hen Hacks, University of Delaware

- Participated in a 24-hour hackathon conducted by the University of Delaware.
- Built a website in improving financial literacy in underserved communities in Delaware.
- Successfully launched a website to facilitate the community in providing the best resources when it comes to looking out for a loan.