

# Paul J. MELLO

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📍 Half Moon Bay, California

**SUMMARY:** AI graduate student leveraging generative modeling, representation learning, and statistical mechanics to investigate deep neural networks (DNN). Utilizing information theory and manifold learning to identify and mitigate biases, understand limitations, and optimize DNNs. Data-driven research approaches with academic collaboration for AI solutions.

## EDUCATION

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**Artificial Intelligence — *Master of Science*** AUG 2021 - MAY 2024

Charles W. Davidson College of Engineering  
San José State University, California

Related Coursework: Deep Learning, Autonomous Systems, Data Science

**Computer Science — *Bachelor of Science* | Mathematics, Philosophy - *Minor*** AUG 2016 – MAY 2021

College of Engineering & Computer Science  
Sacramento State University, California

Related Coursework: Machine Learning, Software Engineering  
Honors: Dean's List Recipient

## EXPERIENCE

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**Information Processing in Diffusion Processes — *Master's Thesis*** MAY 2022 - MAY 2024

- Leveraged neural estimators and generative modeling to explore information flow in thermodynamic systems.
- Discovered an implicit bias of diffusion models to generate classes with specific information-theoretic properties.

**Multi-Resolution Diffusion for Privacy-Sensitive Recommender Systems — *Paper*** MAY 2023 - NOV 2023

- Co-authored a SOTA score-based latent diffusion architecture to synthesize privacy preserving data for recommender systems.
- Developed a novel score-based objective, inspired by denoising score matching, to mitigate generative modeling biases.

**Flower Classification — *Kaggle Competition*** JAN 2022 - MAY 2022

- Lead a computer vision team training models on Google TPU's resulting in a 12/162 leaderboard ranking.
- Engineered a weighted ensembling technique coupled with denoising architectures to boost model classification accuracy across various well-established models and achieve a strong unified classification model.

**Amputee Rehabilitation Software — *Capstone Project*** AUG 2020 - MAY 2021

- Managed an 8-person team to develop rehabilitation software in close partnership with medical specialists.
- Designed an application to collect, process, visualize, and store patient data for medical professionals to provide individualized care.

**Competitive Director — *Sports Club*** AUG 2018 - DEC 2019

- Held Big Sky's committee chair to facilitate intercollegiate competition between dozens of competing universities.
- Directed competitive operations of over a dozen teams across various sports, tournaments, and divisions.
- Spearheaded initiatives that increased club enrollment by 300% year-over-year, implementing a scalable and efficient organizational framework to accommodate consistent growth and ensure sustained success.

## PROJECTS

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**Image Annotation Generator — *Course Project*** AUG 2022 - DEC 2022

- Developed a machine learning method to caption images and enhance prediction accuracy through frequency balancing.

**Stock Market Chatbot — *Personal Project*** AUG 2021 - DEC 2021

- Created an NLP chatbot to retrieve and relay real time NYSE data through Alpha Vantage API calls.

**Population Projection — *Course Project*** AUG 2021 - DEC 2021

- Utilized machine learning and time series forecasting on World Bank Data to predict global population trends, uncover hidden patterns through statistical analysis, and illuminate long-term trends via data science and visualization.

## SKILLS

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### Programming Languages and Libraries

- Languages: Python, R, C, C++, Shell, Java, Go, Ruby, SQL
- Libraries: PyTorch, TensorFlow, Keras, tinygrad, Jax, NumPy, Scikit-learn, Pandas, Seaborn, Matplotlib, NLTK, OpenCV