REVENTH SHARMA

Homepage: `reventh-sharma.github.io` ◇ Github ◇ LinkedIn

Phone: (+1) 858-241-4853 ◇ Email: `resharma@ucsd.edu` ◇ Location: San Diego, CA

EDUCATION

University of California San Diego — Sep 2023 - Jun 2025 (expected)

Master of Science in Data Science (GPA: 4.0/4.0)

Relevant Coursework: Advanced Computer Vision, Machine Learning Systems, Advanced Data Mining, Machine Learning, Causal Inference, Numerical Linear Algebra

Birla Institute of Technology & Science (BITS), Pilani — Aug 2017 - Jul 2021

Bachelors in Chemical Engineering, Minor in Data Science (GPA: 8.74/10.0)

Relevant Coursework: Neural Networks & Fuzzy Logic, Machine Learning, Optimization, Data Mining, Applied Statistical Methods, Linguistics

RESEARCH INTERESTS

My research interest lies at the intersection of Machine Learning, Computer Vision and Cognition theory, focused in building robust and scalable foundational models with advanced reasoning

RESEARCH EXPERIENCE

Centre for Visual Computing — **UCSD**

Research Assistant — Aug 2024 - Present

Advised by: Prof. Manmohan Chandraker

Project: Foundational Model for Texture, Illumination and Spatial Reasoning [1]

· Leading development of a Vision-Language Model capable to infer single RGB images (of indoor scenes, captured under unconstrained conditions) for object's location and texture, and scene illumination

· Built framework to map scenes' rendering component to natural language description, and created ground truth VQA and captioning dataset, currently consisting of 118K indoor scenes

· Ongoing: Building modules for LlaVa pre-training, fine-tuning and developing strategies to benchmark incorporated capabilities

MixLab — **UCSD**

Research Assistant — Dec 2023 - Present

Advised by: Prof. Zhiting Hu

Project: World Models Benchmark [2]

· Created benchmark dataset to evaluate VLMs capability to perceive environment's state change caused by agent's action described in natural language, or vice versa

· Developed modules to capture embodied agent's states across multiple views (top-down, egocentric) and modalities (videos, RGB frames, JSON) during random and targeted navigation in indoor scenes

· Initiated creation of counterfactual reasoning benchmark by introducing obstacles for embodied agent movement, which evaluates VLMs reasoning on agent's navigation under obstructed conditions

Project: Efficient Concept Learning using Causal Inference

· Collaborated on DARPA-funded initiative for building few-shot learning framework to categorize objects within images through visual concepts

· Proposed and performed causal discovery analysis to map object concepts to categories achieving 85% accuracy in predicting classes through sparse concepts

· Led hour long knowledge share sessions at MixLab, by presenting literature survey of prevalent models for causal learning and causal representation learning

Center for Applied Internet Data Analysis (CAIDA)   **UCSD**
Graduate Student Researcher   Jan 2024 - Present
Advised by: Prof. KC Claffy and Ricky Mok

Project: Botnet Scan Event Detection Benchmark[3]
· Co-leading benchmark creation to detect internet-wide vulnerable port scanning activities that form precursor to DDoS attacks
· Transformed 72TB of monthly PCAP data received by UCSD's network telescope to time series stream
· Developed parallelized implementation for matrix factorization and tensor decomposition algorithms on HPC cluster, to detect anomalous behavior, with 99% recall in detecting Mirai & Hajime botnets
· Ongoing: Developing python based open-source library for low-rank-approximation for sparse tensors using fiber sampling tensor decomposition and non-negative tucker decomposition

PUBLICATIONS

[1] **Reventh Sharma** and Manmohan Chandraker, "VR-ITS: Vision Reasoning for Illumination, Texture, and Space," In Preparation for ICCV-2025 submission.
[2] Qiyue Gai et al., [**Reventh Sharma**], "WMBench: Towards Systematic and Unified Evaluation of World Models," In Preparation for arXiv release.
[3] Max Gao, **Reventh Sharma**, Ricky Mok, Esteban Carisimo, Nishanth Arumugam, Eric Li, and KC Claffy, "SoK: Benchmarking the Efficacy of Automatic Darknet Event Detection Methods," In Preparation for USENIX-2025 submission.

WORK EXPERIENCE

Fair Issac Corporation (FICO)   **San Diego, CA**
Analytics Science Intern   Jun 2024 - Sep 2024
Managers: Joseph Murray and Scott Zoldi

· Built 1B+ parameter autoregressive LLM models, pre-trained and instruction-tuned on FICO's fraud analytics data, to serve as knowledge assistant for analytics team

Couture.ai   **Bangalore, India**
Machine Learning Engineer   Jan 2021 - Jul 2023
Manager: Shobhit Agarwal

· Built image-search and recommendation systems serving over 100M users on a fashion eCommerce platform, leveraging contrastive learning and masked-language modelling, achieving 15% increase in purchase conversions
· Built system supporting real-time object detection and retrieval of fashion products from images in wild, with under inference latency 100ms

OPEN SOURCE PROJECTS

DiTP: Transformer-Based Diffusion Model for Trajectory Planning   [Paper, Github]
· Path-planning algorithm based on Diffusion-Transformers providing SOTA performance on sparse-reward reinforcement learning environments such as Maze2D

LLM-Embed: Increasing Performance of RAG using LLMs as Encoder   [Paper, Github]
· Document retrieval system with causal-LLMs as text encoders, achieving $5\times$ retreival accuracy enhancement, and supporting explainability analysis for contextual understanding across LLM layers

SKILLS

Programming Languages	Python, Scala, C/C++
Machine Learning Tools	PyTorch, Tensorflow, OpenCV, Sklearn, Causal-Learn, Pandas, Numpy
Frameworks	Spark, Docker, Weights & Biases, TensorBoard, Kubernetes, CUDA
	Habitat-Lab, OpenAI Gym, AI2Thor, OptixRenderer

TEACHING EXPERIENCE

Teaching Assistant   Winter 2024
Instructor: Prof. Russell Impagliazzo   Department of Computer Science & Engineering, UCSD

· Providing academic assistance for graduate course Algorithms Design & Analysis (CSE 202)

Teaching Assistant   Spring 2024
Instructor: Marc Sprague-Piercy   Department of Chemistry and Biochemistry, UCSD

· Led group of 24 students through Recombinant DNA Analysis Lab (CHEM 109)

ACHIEVEMENTS

Merit-Cum Need Scholarship awarded by BITS Pilani for Academic Excellence   Aug 2017 - Jun 2021

REFERENCES

Manmohan Chandraker	Zhiting Hu	Ricky Mok
Professor	Assistant Professor	Research Scientist (PI)
UC San Diego	UC San Diego	CAIDA
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KC Claffy	Suresh Gupta
Adjunct Professor / PI	Professor
UC San Diego / CAIDA	BITS Pilani
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