Umesh Kumar Singla

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Education

2020 - 2022 **University of California San Diego**
M.S., Computer Science (GPA: 3.96/4.0)
Thesis: Exploration in Complex Naturalistic Behavior
Advisor: Dr. Marcelo Mattar

2014 - 2018 **IIIT Hyderabad**
B.Tech., Computer Science & Engineering (GPA: 8.50/10.0)
Honors in Cognitive Science

Experience

2023 - Present **Princeton Neuroscience Institute,** Princeton University
Research Assistant | Advisors: Dr. Mala Murthy and Dr. Jonathan Pillow
• Develop statistical models to decode latent states governing behavior and neural activity of female *Drosophila* in a social interaction setting.

2020 - 2022 **Department of Cognitive Science,** UC San Diego
Graduate Student Researcher | Advisor: Dr. Marcelo Mattar
• Using reinforcement learning to study exploration, planning and decision making with animal behavior recordings in sequential and bandit tasks.

2018 - 2020 Software Engineer, **Joveo, Inc.,** Hyderabad
• Design, code, troubleshoot, and support scalable big data pipelines for the data science team. Technologies used were AWS, Spark, Airflow, and Map-Reduce.

2017 - 2018 **Brain, Cognition and Computation Lab,** IIIT Hyderabad
Undergraduate Researcher | Advisors: Dr. Raju S Bapi
• Design, collect and analyze data from human subjects performing a serial reaction time experiment to study implicit learning of auditory sequences.

Publications

In Preparation

- **Umesh Singla**, Albert Lin, Jonathan Pillow*, Mala Murthy*. Changes in internal state in female *Drosophila* during courtship.
- Shruthi Ravindranath, **Umesh Singla**, Junyu Li, Talmo Pereira, Jonathan Pillow, Mala Murthy. Multiscale generative modeling framework for mapping a social interaction.

Conferences

1. (submitted) **Umesh Singla**, Albert Lin, Jonathan Pillow, Mala Murthy. Modeling multi-timescale locomotor decisions in female *Drosophila* during social interactions. *Cosyne*.
2. (talk) **Umesh Singla**, Marcelo Mattar. Temporal persistence explains mice exploration in a labyrinth. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 2024.
3. (poster) **Umesh Singla**, Marcelo Mattar. Temporal abstraction in animal exploration in complex environment. *Cognitive Computational Neuroscience (CCN), Boston, MA*, 2024.

4. (poster) Shruthi Ravindranath, **Umesh Singla**, Junyu Li, Talmo Pereira, Jonathan Pillow, Mala Murthy. Inferring the latent structure underlying naturalistic social interactions. *Neuroethology: Behavior, Evolution and Neurobiology*, Vermont, 2023 (poster).

5. (poster) **Umesh Singla**, Pramod Kaushik, Eduardo A. Garza-Villarreal and Vinoo Alluri. Replicating impaired resting state functional connectivity in chronic cocaine users. *5th Annual Conference of Cognitive Science. IIT Guwahati, India*, 2018 (poster).

6. (poster) **Umesh Singla**, Anuj K. Shukla and Raju S Bapi. Implicit sequence learning in auditory domain. *IIIT Hyderabad Undergraduate Research Showcase*, 2017.

Journals

1. Sharon Noh, **Umesh Singla**, Ilana Bennett, Aaron Bornstein. Memory precision and age differentially predict the use of decision-making strategies across the lifespan. *Scientific Reports*, 2023.

2. Arun Garimella, **Umesh Singla***, Sourabh Rajguru*, and Vinoo Alluri. Marijuana and the hippocampus: A longitudinal study on the effects of marijuana on hippocampal subfields. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 2020.

Invited talks

1. Learning and Planning in Reinforcement Learning. *The NorthCap University, New Delhi, India*, 2023.

Internships

Jun - Aug 2017 **Google Summer of Code**, MacPorts *Remote*
• Implemented the migrate command in Tcl and C to automate the end-to-end process of reinstalling packages to ensure a smooth transition after an OS upgrade.

May - Jun 2017 **Research Engineering Intern**, Samsung Research *Bangalore, India*
• Analyze time-series data from CPU usage and network logs for anomaly detection.
• Study fault localization methods to detect faulty operations in cloud systems at runtime.

Teaching

UC San Diego (Graduate Teaching Assistant)

Fall 2021	CSE 250A: Probabilistic Reasoning and Decision-Making
Fall 2022	DSC 180A: Data Science Senior Capstone Project
Spring 2022	DSC 190: Intro to Machine Learning
Winter 2021, 2022	DSC 102: Systems for Scalable Analytics
Summer 2022	CSE 8A: Intro to Programming in Python
Summer 2021	CSE 141: Intro to Computer Architecture

IIIT Hyderabad (Tutor)

Spring 2018	ICS 251: Computer Networks
Spring 2017	IEC 103: Basic Electronic Circuits
Fall 2016	IEC 102: Electrical Science 1

Volunteering

2024	Reviewer for CCN 2024.
2022	Jacobs Undergraduate Mentoring Program graduate mentor, UCSD
2021	oSTEM Qtorship mentor, UCSD
2018, 2019	Open source contributor for MacPorts.

Awards

2024	Graduate school application scholarship, AACN ($550)
2014 - 2015	Dean's List, IIIT Hyderabad
2014	INSPIRE Scholar, Department of Science and Technology, Govt of India

Relevant coursework

Princeton

Statistical Modeling and Analysis of Neural Data
Statistics for Neuroscience

UC San Diego

Probabilistic Reasoning and Decision-Making; Search and Optimization; Deep Generative Models
Recommender Systems; Structured Prediction for NLP; Algorithm Design

IIIT Hyderabad

Statistical Methods in AI; Discrete Mathematics; Linear Algebra; Probability; Calculus I, II
Intro to Neural and Cognitive Modeling; Intro to Cognitive Science; Game Design
Information Retrieval & Extraction; Language, Mind and Society
Complexity and Algorithms; Theory of Computation; Software Design
Distributed Systems; Database Systems; Computer Networks

Skills

Programming	Python (PyTorch, JAX, Dynamax, scikit-learn, numpy, PyStan), MATLAB, SQL
Others	Linux, Cloud (AWS/GCP), Git, Docker, HTML/JavaScript

References

Dr. Marcelo G. Mattar, New York University (**marcelo.mattar@nyu.edu**)
Dr. Jonathan W. Pillow, Princeton University (**pillow@princeton.edu**)
Dr. Mala Murthy, Princeton University (**mmurthy@princeton.edu**)