Karthik Prabhu Palimar

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Summary

Associate in Fraud Analytics at Avant with experience in statistical modeling, machine learning, and large-scale data analysis. Focused on building data-driven methods for fraud detection, risk assessment, and decision-making. Prior to this, I completed my Ph.D. in Physics at the University of California, Davis, where I worked on high-dimensional statistical inference and machine learning models in cosmology.

Education

Ph.D. Physics *University of California-Davis, Davis, CA* 2018 - 2025
B.S. - M.S. Physics *IISER-Pune, Pune, India* 2013 - 2018

Skills

Statistical Modeling	Predictive modeling, Bayesian inference, uncertainty quantification
Machine Learning	Classification, time-series analysis, generative modeling
Frameworks & Tools	PyTorch, scikit-learn, NumPy, Pandas
Programming Languages	Python, SQL, Julia

Experience

Associate, *Fraud Analytics, Avant* Jan 2026 - Present

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Doctoral Researcher, *Department of Physics and Astronomy, UC Davis* Sep 2018 - Dec 2025

- Developed generative models using Denoising Diffusion Probabilistic Models in PyTorch to simulate complex non-Gaussian foregrounds; preserved target statistics within 25% of sample variance, enabling more reliable downstream analyses
- Released an open-source framework (GitHub) that serves as a $\sim 1000\times$ faster surrogate to N-body runs, making large ensemble studies practical for survey design and bias checks
- Scaled training and inference on Perlmutter (supercomputer) with PyTorch + CUDA + HF Accelerate; converted pipelines to multi-GPU, cutting wall-clock per experiment from over 100s of hours to 30 hours
- Presented results at conferences and journals; maintained reproducible code and documentation for collaborators

Intern, *Handshake AI, Remote* Jun 2025 - Nov 2025

- Designed and evaluated domain-specific prompts to assess large language model (LLM) reasoning in physics
- Analyzed outputs for accuracy, clarity, and depth, informing improvements in scientific reliability of LLMs
- Collaborated with domain experts to integrate findings into design guidelines for newer fellows

Deep Learning Fellow, *Erdos Institute Bootcamp, Remote* Apr 2024 - May 2024

- Built a Retrieval-Augmented Generation (RAG) system that processed 5.5M Reddit posts using GTE-BERT embeddings, LangChain, and sentiment-aware re-ranking; delivered sub-1s query latency
- Improved Mean Reciprocal Rank by 12% across 160 tested configurations through retrieval tuning and evaluation
- Secured first place in the competition for code performance and meeting the KPIs

Selected Publications [Google Scholar]

Learning Correlated Astrophysical Foregrounds with Denoising Diffusion Probabilistic Models
A Generative Model of Galactic Dust Emission Using Variational Autoencoders