

Pinak Mandal

Glebe - 2037, NSW

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Academic Highlights

- 2nd place at national level mathematics exam IIT-JAM 2014
- 9th place at national level mathematics exam TIFR-GS 2016
- 15th place at national level math exam (for lecturership in India) NET 2016
- Future Research Talent Fellow (Australian National University) 2021

Education and Work

- **University of Sydney, Sydney** 2023 - 2025
Postdoc (Machine Learning and Dynamical Systems)
- **International Centre for Theoretical Sciences, Bengaluru** 2017 - 2023
PhD (Applied Mathematics and Deep Learning)
Thesis: Numerical Filter Stability, Fokker-Planck Equations and Infinite Dimensional Optimization with Deep Learning
- **Jadavpur University, Kolkata** - MSc (Mathematics) 2014 - 2016
- **Jadavpur University, Kolkata** - BSc (Mathematics) 2011 - 2014

Projects

I have worked on a broad range of applied problems with a recent focus in fundamental machine learning.

- **Unlearning in generative models, USyd** 2025
Currently developing methods for forgetting sensitive training data in trained generative models.
- **Learning dynamical systems from data with Random Feature Maps, USyd** 2024
Developed a data-driven method for sampling the non-trainable parameters of tanh random feature maps. Conceptualized and implemented deep and local variants of the random feature map to achieve state-of-the-art forecast times for chaotic dynamical systems.
- **Solving partial differential equations and constrained optimization problems with deep learning, ICTS** 2021-2023
Developed deep learning based algorithms for solving high-dimensional Fokker-Planck equations and problems in calculus of variations.
- **Data Assimilation, ICTS** 2020-2021
Developed and applied a method for computationally assessing the stability of numerical filters such as EnKF and particle filters.

- **Predicting Visual Stimuli from fMRI Data, Neuromatch Academy** 2021
Used fMRI data to predict images seen by human subjects (in collaboration with an international group of graduate students).
- **Atmospheric Plume Modelling, ICTS** 2019
Developed a PDE-based model for air pollution estimation using OpenStreetMap data.
- **Data Analytics, Computational Geometry and Topology, and Genetic Algorithms IISc** 2018
These short projects include, but are not limited to, analyzing chromosome data to determine gene configurations that cause color blindness, finding social structures in a groups of dolphins in Doubtful Sound (NZ), music genre classification with machine learning, designing approximate solvers for NP-hard problems with genetic algorithms, and exploring the structure of the telecom data of Trentino using topological data analysis.

Conferences

I have presented my work at several conferences. Some of them are listed below.

- Numerical methods for complex high dimensional systems - Jervis Bay 2024
- 6th workshop on sequential Monte Carlo methods - ICMS, Edinburgh 2024
- Variational principles of plasma confinement in 3D magnetic fields - ANU, Canberra 2023
- 7th Indian control conference - IIT Bombay, Mumbai 2021

In 2025 I helped organize a minisymposium titled "Data-driven reconstruction and forecasting of dynamical systems" at SIAM DS25 in Denver.

Publications and Visualizations

- A list of my research articles can be found [here](#).
- A gallery of visualizations from some of my projects is available at my [Github page](#).

Software

I am primarily a Python coder with some experience in MATLAB and C. I have written several Python modules for various tasks such as implementation of hit-and-run random feature maps, solving high dimensional partial differential equations, and simulation of generic random variables and stochastic processes. I have several years of experience with Python's standard scientific libraries as well as ML libraries such as tensorflow and Pytorch. Most of my software projects are publicly available on [Github](#).

Referees

[Vishal Vasan](#) - ICTS , [Amit Apte](#) - IISER Pune, [Sreekar Vadlamni](#) - TIFR CAM, [Georg Gottwald](#) - USyd