

Himadri Mandal

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in quirtt

*"If I have seen further it is by standing on the shoulders of
Giants" — Isaac A. Newton*

Current Interests

Machine Learning, AI Safety, Statistics, Mathematics, Programming, Entrepreneurship, Philosophy

Education

Indian Statistical Institute, Kolkata

August 2023 — present

Statistics Undergraduate, Semester 1 — 94.4%

Programming experience.....

Python, Bash, R, Next.js + TailwindCSS, \LaTeX , Linux (Arch Linux on i3)

Skills.....

Leadership, Deductive Reasoning, Debate, Direct Communication, Typing (100+ wpm)

Selected fellowships and awards

ISI K. Semester 1 Outstanding Performance: awarded January 2024, received ₹1500

ISI Kolkata B.Stat. Entrance: awarded August 2023, ranked 11th

JEE Mains: awarded March 2023, top 1%ile

IISc Enumeration Finalist: awarded October 2022, ranked top 10

Atlas Fellowship Finalist: awarded September 2022, received 1000\$, top 200 in a rationality fellowship

CMI Tessellate Finalist: awarded October 2021

Indian Olympiad Qualifier for Mathematics, KV: awarded February 2021, ranked top 10

Selected Courses

CaMLAB: Cambridge AI Safety Hub

April 8 — April 21

A course to build the ML engineering fundamentals needed for AI Safety Research including basics of PyTorch, building, training and tuning GPTs and ResNets, interpreting models with TransformerLens, and some emphasis on intro to RL, Deep RL and some RLHF..

Deep Learning: ISI Kolkata

January 2024 — March 2024

A winter course on deep learning covering Autoencoders, CNNs, GANs, GNNs, Diffusion models, RNNs, Attention mechanics, Transformers, etc.

Measure Theory: Maths Club, ISI Kolkata

December 2023 — February 2024

Took an introductory course on Measure Theory which helped me understand more of the underpinnings of probability in Statistics.

Last updated May 15, 2024

Topped the class with a 99/100. It covered Linear Operators, Matrices, Dual Spaces, Tensor Products, Alternating multilinear maps, Inner Products etc. An extension of it also covered Eigenvalues, Nilpotent Operators, Jordan Canonical Form, Spectral Theorem, Basic Group Representations, etc.

Projects

Theoretical.....

Universal Source Coding: quirtt.github.io/report.pdf

The broad setup is the following: there's data coming in from some source. If the source distribution is known, then Huffman Encoding gives the optimal encoding scheme. This project tries to figure out a good encoding scheme (in multiple contexts!) that guarantees performance against all source distributions!

Independence Is Almost Dependence: quirtt.github.io/posts/nelson/nelson.html

My proof to a theorem: given two independent random variables X, Y you can come up with two new random variables U, V which have the same marginals and ϵ -close joints but are deterministically dependent.

Shannon's Mind Reading Game: github.com/quirtt/proj_sm1_shannon

The magician sends you a deck of cards. You riffle shuffle it three times. You pick the card from the top and put it back in the deck, somewhere. You send the deck back to the magician. Can he find the chosen card? See quirtt.github.io/posts/shannon-cardmagic-trick/shannon-cardmagic-trick.html

Cold Reflections: quirtt.github.io/

My blog on Mathematics, Statistics, Philosophy and everything else that interests me.

Empirical/Programming.....

Ponderings on OthelloGPT: quirtt.github.io/posts/OthelloGPT/OthelloGPT.html

MechInterp. OthelloGPT is a GPT model trained on Othello games to predict all the possible legal moves. I look into how the model computes how a certain cell is blank.

ORIGAMI: github.com/quirtt/ORIGAMI/

Implements arXiv:2303.17062, AISTATS 2023. A paper on dimensionality reduction of the support to improve computational efficiency in downstream decision making.

probmgr: github.com/quirtt/probmgr

Bash script. Creates a virtual environment to manage texfiles and implement search (with tags), and grouping into handouts using problemcodes. Originally created to help olympiad math problem solving.

Selected work experience

Software.....

Website Lead: MTRP, Integration

November 2023 — January 2024

Deployed a website for the university's fest's annual mathematics competition after learning NextJS and TailwindCSS, all of it took a week. Maintained it for efficiency and bugfixes. See mtrp.integrationfest.in. The github repo: github.com/Integration-ISIK/mtrp-2024-website

Volunteer and outreach.....

Owner: awas

October 2020 — October 2022

Served as the **organizer and mentor** for daily math problem solving sessions, philosophical debates, and programming discussions for over two years on **Discord**. Mentored smart math enthusiasts, from all over India, learn hard math, and guided a few of them to get into the Indian training camp of IMO.