Sagnik Anupam

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Education

University of Pennsylvania 2024-
PhD in Computer and Information Science

Massachusetts Institute of Technology 2020-24
B.S. in Computer Science and Engineering (6-3) and Mathematics (18)
GPA: 5.0/5.0

Research Interests

I am interested in the intersection of machine learning and programming languages, with a focus on building interpretable neurosymbolic AI models. I currently research methods for training models to learn strategies for code understanding and reinforcement learning, using methods like contextual retrieval and library-learning models.

Research Experience

Interpretable Performance-Improving Code Edits 2024-
trustML@Penn, University of Pennsylvania
- Investigating methods for code retrieval and identifying reusable performance-improving edits.
- Working with Osbert Bastani.

Neurosymbolic Reasoning for Mathematical Domains 2022-24
Computer Aided-Programming Group, MIT CSAIL
- Trained program synthesis models to develop interpretable mathematical equation-solving strategies.
- Outperformed previous methods by **5.82%**, worked with Armando Solar-Lezama and Omar Costilla-Reyes.

Neural Decoding Using Signature Methods 2023
Department of Mathematics, Imperial College London
- Studied applications of signature objects in modelling neural signals from mice.
- Proved properties of signature objects for approximating functions, worked with Cristopher Salvi.

Phonation Event Detection for Feature-Cue-Based Analysis 2020-22
Speech Communication Group, MIT Research Laboratory of Electronics (RLE)
- Built a dataset of labeled spectrograms and developed models to identify glottal-tier acoustic cues.
- Improved baseline by **16.87%**, worked with Stefanie Shattuck-Hufnagel and Jeung-Yoon (Elizabeth) Choi.

Selected Publications

2024 **Anupam, S.**, Bowers, M., Costilla-Reyes, O., & Solar-Lezama, A. (2024). MathDSL: A domain-specific language for concise mathematical solutions via program synthesis. *The 4th Workshop on Mathematical Reasoning and AI at NeurIPS'24.*

2024 **Anupam, S.**, Choi, J.-Y., & Shattuck-Hufnagel, S. (Forthcoming). Detection of phonation events for feature-cue-based analysis using gaussian mixture models. *Proceedings of Meetings on Acoustics.*

2021 **Anupam, S.**, & Kar, A. K. (2021). Phishing website detection using support vector machines and nature-inspired optimization algorithms. *Telecommunication Systems*, *76*(1), 17–32.

2020 **Anupam, S.**, & Pani, P. (2020). Flood forecasting using a hybrid extreme learning machine-particle swarm optimization algorithm (ELM-PSO) model. *Modeling Earth Systems and Environment*, *6*(1), 341–347.

Preprints

2023 Ghosh, S*., & **Anupam, S***. (2023). CapText: Large language model-based caption generation from image context and description. *arXiv preprint arXiv:2306.00301*.

2023 **Anupam, S.***, Lu, N*, & Sragow, J*. (2023). Algorithms for multiple drone-delivery scheduling problem (MDSP). *arXiv preprint arXiv:2306.10368*.

Presentations

ASA21 Anupam, S., Choi, J.-Y., & Shattuck-Hufnagel, S. (2021). Automated detection of glottal-related acoustic cues for feature-cue-based analysis. *The Journal of the Acoustical Society of America*, *150*(4_Supplement), A356–A356.

Presented at the Large-Scale and Remote-Platform Acoustic Analysis poster session of the 181st Meeting of the Acoustical Society of America (ASA) held at Seattle, WA, from 29 November-3 December 2021.

Professional Experience

AI/ML Engineering Intern 2024

Everyday Goods

- Developed AI model pipelines to automate the processing of inventory management system records.
- Improved efficiency by 25% and speed of customer onboarding by 75%.

AI/ML Engineering Intern 2022

FindOurView

- Built transformer-based natural language processing models for text classification and generation tasks.
- Reduced manual effort by 70%, sped-up pipeline by 15%, reached model accuracy of $> 90\%$ on some tasks.

Awards

2022-23 MIT EECS Gerstle Undergraduate Research and Innovation Scholar

2022 MIT Pokerbots Citadel Prize

2022 MIT CMSW Boit Manuscript Prize for Poetry, 1st Prize

2022 MIT CMSW Robert A. Boit Prize for Poetry, 3rd Prize

2019 Intel International Science and Engineering Fair (ISEF), Third Grand Award

2018 International Philosophy Olympiad, Bronze Medal

2017 International Linguistics Olympiad, Honorable Mention

* indicates equal contribution.

Organizations

2024-	Phi Beta Kappa Honor Society
2023-	IEEE-HKN (Eta Kappa Nu) Honor Society
2023-24	AI@MIT AIM Labs (Spring 2023 Cohort Member, 2023-24 Co-President)
2021-22	MIT Undergraduate Practice Opportunities Program (UPOP)

Skills

Programming	Python, C/C++, OCaml, MATLAB, SQL, HTML, CSS,JavaScript
Languages	English, Hindi, Odia
Machine Learning	numpy, pandas, scikit-learn, transformers, nltk, flair, TensorFlow, openai, EvoloPy, PyTorch, Hugging Face