Kunjal Panchal

(413) 210 9198 | kpanchal@umass.edu | astuary.github.io/Kunjal/ | github.com/astuary | linkedin.com/in/kunjal-panchal

Skills

Programming Python [PyTorch, Tensorflow, Flower (Federated Learning Framework), Hugging Face, scikit-learn, Numpy, Pandas], C/C++.
Machine Learning Federated Learning, Distributed ML, Optimization, Meta Learning, Statistics, Natural Language Processing, Generative AI.

Education

University of Massachusetts Amherst *Amherst, MA*
Doctor of Philosophy in Computer Science (3.7/4.0 GPA) *Sep 2021 - Expected May 2026*

- Advisors: Dr. Hui Guan and Dr. Adam O'Neill.
- Research Area: Heterogeneity across data and time in Federated Learning, Personalization in Federated Learning, Meta Learning.
- James Kurose Scholar (scholarship given for systems in machine learning project, Spring 2022).
- Jumpstart Fellow (fellowship given to top 5 research proposals by new PhD students, Fall 2021).

University of Massachusetts Amherst *Amherst, MA*
Master of Science in Computer Science Research Track (3.6/4.0 GPA) *Sep 2019 - May 2021*

- Advisor: Dr. Adam O'Neill.
- Research Area: Relaxed Cryptography for Digital Signatures and Message Authentication Codes.
- **Courses:** Machine Learning, Computer Vision, Natural Language Processing, Reinforcement Learning, Robotics, Optimization in Computer Science, Advanced Algorithms, Modern Computer Architecture, Advanced Cryptography.

The Maharaja Sayajirao University of Baroda *Vadodara, India*
Bachelor's in Engineering in Computer Science and Engineering (4.0/4.0 GPA) *Aug 2015 - Apr 2019*

- Gold medalist in Computer Science and Engineering (2019).
- Student of the Year (class of 2019).

Work Experience

Adobe Research *San Jose, CA*
Research Scientist/Engineer Intern *May 2023 - Aug 2023*

- Currently working on a meta-learning solution to boost in-context learning (ICL) performance of large language models (LLMs) for in-domain and cross-domain settings, under the constraints of insufficient examples, and insufficient context window length to perform ICL.

Adobe Research *Bangalore, India*
Research PhD Intern *May 2022 - Aug 2022*

- Built a federated solution of personalized recommendation systems and classifiers for real-time on-device learning, by using early-stopping for client-side updates and drift adaptation at server-side, to achieve robustness against concept drift (distribution change with respect to time).
- Presented a drift-aware adaptive optimization strategy that can quickly adapt to various concept drift patterns (sudden, incremental, and re-current), by taking into account historical gradient updates and identifying change in gradient magnitude as drifts, to achieve lowest accuracy drop and fastest recovery from the said drifts.
- Evaluated the proposed algorithm on benchmark computer vision and natural language processing tasks, achieving the lowest accuracy dip difference (the lower, the better) of 1.48%-2.99%, while the best performing baselines exhibit 3.15%-9.22%.

Manning College of Information and Computer Sciences, UMass Amherst *Amherst, MA*
Research Assistant *Sep 2021 - Current*

- Working on solving open issues of personalization (heterogeneity across clients) and drift (heterogeneity across time) in Federated Learning.
- Formulated a per-instance and per-client personalization strategy in federated learning based on the concepts of dynamic routing and gating, increasing the personalized performance of the participating clients in the distributed training.
- Explored a more robust notion of differential privacy based on conditional statistical distance.

SureStart *New York City, NY (Remote)*
AI and Machine Learning Head Mentor of MIT FutureMakers 2022 *Jul 2022 - Aug 2022*

- Led technical sessions in a 6 weeks workshop program on applied deep learning, as a head mentor of 50+ students, by daily presenting and teaching deep learning concepts.
- Contributed in curriculum building to support the daily discussion sessions on the nuances of applied deep learning concepts like optimization, generative networks, algorithmic biases, regularization.
- Managed teams of 5 in multiple SureStart programs and guided the teams to build a deep learning based capstone project addressing real-world challenges like awareness on harmful ingredients in processed food (Winner in Feb 2023), marine pollution (Runner up in Jun 2022), automotive safety (Winner in Feb 2021), and climate change.

Research

Flash: Concept Drift Adaptation in Federated Learning

Kunjal Panchal, Sunav Choudhary, Koyel Mukharjee, Subrata Mitra, Somdeb Sarkhel, Saayan Mitra, and Hui Guan *Fall 2022*

Published @ ICML, 2023.

Flow: Fine-grained Personalized Federated Learning through Dynamic

Kunjal Panchal, Sunav Choudhary, and Hui Guan *Summer 2022*

CrossFL @ MLSys 2022; Under review @ NeurIPS, 2023.

Robust Indistinguishability

Monica Moniot, **Kunjal Panchal**, Amir Houmansadr, and Adam O'Neill *Fall 2022*

To be submitted @ CCC, 2023.

Leadership

Jun 2023 **Research Mentor for Undergraduates**, UMass Amherst CS department program to cultivate interest & understanding in research
Jan 2023 **Applied Deep Learning Head Mentor**, Teaching applied deep learning to undergradutes at SureStart
Dec 2022 **Research Mentor for Undergraduates**, UMass Amherst CS department program to cultivate interest & understanding in research
Jan 2022 **Coding Gym Leader**, SureStart winter bootcamp to teach coding interview strategies
Oct 2021 **PhD Applicant Support Program**, Mentoring prospective PhD applicants
Mar 2021 **Machine Learning Mentor**, Virtual AI Learning Program hosted by SureStart
Aug 2020 **Emotion AI Program Mentor**, EMPath Program hosted by Affectiva
Dec 2019 **Campus Leader**, Google Developer Students Club India

Achievements

2022 **James Kurose Scholarship**, Manning College of Info and Comp Sci, UMass Amherst
2021 **CICS Jumpstart Fellowship**, College of Info and Comp Sci, UMass Amherst
2019 **Gold Medalist**, The Maharaja Sayajirao University of Baroda, B.Engg. in Computer Science
2019 **Student of the Year**, The Maharaja Sayajirao University of Baroda, B.Engg. in Computer Science
National Talent Search Examination, Top 100 in Science and Mathematics in India
All India Essay Writing Event, Honorable Mention in a state-level essay competition
Community Science Center, Winner of Conmat Cosmopolitan Tree Garden Award at state-level

Presentations

Voices of Data Science Poster Presenter *Spring 2023*

- Showcased "Flash: Concept Drift Adaptation in Federated Learning" (ICML '23) in an interdisciplinary poster session hosted across computer science, engineering and social/behavioral science departments. Winner of the poster presentation competition.

Computer Science Department Homecoming Poster Presenter *Fall 2022*

- Presented my research to the department alumni, faculty, dean, and current students, as one of the two presenters.

Computer Science Research Night Poster Presenter *Fall 2022*

- Introduced my lab and research to undergraduate and graduate students looking to understand and participate in the ongoing research works.

Cryptography Honors Seminar Speaker *Fall 2022*

- Discussed federated learning, differential privacy, applications, and why confidentiality of data is important in the world which is shifting towards data-rich artificial intelligence.

AI4ALL Summer Program Speaker *Summer 2021*

- Presented detailed pointers on how to read, understand, write research papers in AI and ML.
- Explained how to figure out unsolved yet solve-able problems, conduct research through creative solutions, evaluate results derived of the proposed approach, and discussed ethics and biases in AI.
- Encouraged 20+ undergraduate students from Boston University, Columbia University, and University of California Berkeley to pursue artificial intelligence research.