Mudit Verma

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EDUCATION

Arizona State University, Tempe, AZ   2019 – Expected Fall 2024
Ph.D in Computer Science, Advisor : Dr. Subbarao Kambhampati, GPA : 4.0/4.0

Delhi Technological University (Delhi College of Engineering), New Delhi, India   2015 – 2019
B.Tech in Information Technology, Advisor : Dr. Seba Susan, GPA : 9.6/10 (Gold Medalist)

WORK EXPERIENCE

Apple Inc   May 2023 – Sept 2023
Machine Learning Research Intern, Cupertino, CA

Hosts : Machine Learning Research (MLR) Group, Rin Metcalf and Barry Theobald.
- *(ICLR 2024)***:** Hindsight PRIORs for Reward Learning from Human Preferences. Trained a **Transformer-XL world model & used self-attention** as a novel return redistribution target on Panda Robot, DMControl suite & OpenAI Gym Atari for RLHF.

Apple Inc   May 2022 – Aug 2022
Machine Learning Research Intern, Cupertino, CA

Hosts : Machine Learning Research (MLR) Group, Rin Metcalf and Barry Theobald.
- (NeurIPS HILL 2022, IROS RLCONFORM Oral 2022) **:** Symbol Guided Hindsight Priors for Reward Learning from Human Preferences. Trains a **ViT encoder and Causal Transformer decoder with categorical embedding** for **RLHF**.

Intel Corporation   May 2021 – Aug 2021
Deep Learning Software Engineering Intern, Santa Clara (Remote), CA

Deep Learning Acceleration and implications to explainability. Host : Wei Wang
- Analysis of float32 ResNet50 on Intel IceLake (ICX, **market impact : $140M**) with proposed BFloat16 optimizations, enabling CPU quantized model **deployment for 4 MLP teams. -** Experimented with **saliency based explanations in Quantized ResNet50** on ICX.

Samsung Semiconductor India Research   May 2018 – Aug 2018
Machine Learning Intern, Bangalore, India

- Implemented a DRAM bank simulator **(400x faster than baseline)** followed by Redundancy Analysis. Proposed Monte Carlo Tree Search with ResNet heuristic for Fault analysis. **(SoTA '21). $5,000,000/yr savings** in fault misidentification.
- Awarded Best Intern Project at SSIR.

Samsung Semiconductor India Research   May 2017 – Aug 2017
Machine Learning Intern, Bangalore, India

Worked on reducing write-wearing and improving garbage collection in SSDs. Host : Sandeep Sammatshetti
- Used ML to **reduce SSD read-write-wearing and garbage collection**.. Proposed LSTM based usage prediction for GC over SSD ranks **(28% improvement).** Identified recurring fault-classes (Data Modelling and Validation) and implemented PyQT, Tkinter SSD visualization. Runners up Best Intern Project at SSIR.

SELECTED HONORS & AWARDS

ASU SCAI Doctoral Fellowship ($9300)	2024, 2023, 2019
ASU Engineering Graduate Fellowship ($3000)	2022
Delhi Technological University /DCE Gold Medalist	2019
Delhi Technological University Department Merit Rank Scholarship ($1500)	2019, 2018, 2017
Pramod Jain Scholarship, Best Student at Delhi Technological University ($1200)	2017
First, Smart India Hackathon. Varanasi, India. (37000+ submissions) ($1700)	2019
Education Innovation Mentorship Programme, ReadAlliance USAID (highly selective) ($15,000)	2018

SKILLS

Languages: C++, Python, Java, Javascript, Typescript, React. **Database** : SQL, MongoDB, Oracle, SQLite. **Development** : Microservices, Angular, Springboot, Flask, HTML, CSS, XML, Android, Maven, Gradle, Node.js. **Machine Learning :** PyTorch, Jax, Tensorflow, Numpy, Pandas, NLTK, Matplotlib, OpenCV, WandB, Transformers, MLOps, Deepseed, LLM, LLM-PEFT, LoRA, Mujoco, Dopamine. **Others**: Docker, Kubernetes, Git, JIRA, Kafka, Hadoop, Apache Spark. **Research :** Embodied AI, RLHF, LLM, Safe AI, Personalized AI, AI Agents

SELECTED PUBLICATIONS & PREPRINTS

Overview: Published >20 papers combined in conferences and workshops at venues such as NeurIPS, ICLR, HRI, AAAI, ICML, AAMAS, IROS, ICAPS. Work in my main line of research includes :

- **Hindsight PRIORs for Reward Learning from Human Preferences.**
International Conference on Learning Representations (ICLR) 2024

- **Theory of Mind abilities of Large Language Models in Human-Robot Interaction : An Illusion**
*Conference on Human Robot Interaction (HRI) 2024 **(Oral)** ; Invited Talk: Apple MLR, AGI Leap Summit 2024*
Previously : ICML *Theory of Mind Workshop 2023, ICML Many Facets of Preference Learning 2023* **(Oral)**

- **LLMs Can't Plan, But Can Help Planning in LLM-Modulo Frameworks.**
Position Paper : *arXiv Preprint* 2024

- **Widening the Pipeline in Human-Guided Reinforcement Learning with Explanation and Context-Aware Data Augmentation.**
Conference on Neural Information Processing Systems *(NeurIPS) 2021* **(Spotlight)**

- **Exploiting Action Distances for Reward Learning from Human Preferences.**
Many Facets of Preference Learning Workshop at MFPL ICML 2023, AAAI R2HCAI 2023

- **Symbol Guided Hindsight Priors for Reward Learning from Human Preferences.**
IROS RLCONFORM, NerurIPS HILL 2022 **(Oral)**

- **Benchmarking Multi-Agent Preference based Reinforcement Learning for Human-AI Teaming.**
(Invited AAAI 2024 Ad Hoc Teamwork Talk)

- **Bridging the Gap: Providing Post-Hoc Symbolic Explanations for Sequential Decision-Making Problems with Inscrutable Representations.**
International Conference on Learning Representations (ICLR) 2022, Previously in : ICML HILL 2020

- **Symbols as a Lingua Franca for Bridging Human-AI Chasm for Explainable and Advisable AI Systems.**
Association for the Advancement of Artificial Intelligence AAAI 2021 **(Blue Sky Track)**

OTHER PROJECTS

- **Benchmarking Embodied Agent RLHF with VLMs** (Transformers, Robotics, Vision LM, PyTorch   2024
  - Benchmarking of model alignment between VLMs like CLIP, ALIGN, BLIP, FLAVA and X-CLIP on MuJoCo trajectory data and task description. Fine-tuned VLM to improve task prediction. Trained PPO agent with VLM to report task success.
- **Daily News Summarizer** (T5, BART, PyTorch, Docker, MLOps, Flask, AWS)   2023
  - An abstractive news summarizer model with T5 and BART with RLHF on personalized summary generation. Application scrapes daily news sources, and summarizes them tailored to user's liking (length, style, technical details). Model deployed as an Email Notification service.
- **LoRA Playground** (PyTorch, ResNet, GPT-2, LLaMa, Alpaca, AWS)   2023
  - Performed (LLM-PEFT) Low Rank Adaptation to finetune ResNet50 on datasets like Food, Pet. Performed LoRA instruction fine tuning on GPT-2, LLaMa-7B, Alpaca-7B architecture with PKU-SafeRLHF dataset to increase harmlessness and helpfulness of QA.
- **User Study Interfaces** (*Flask, Firebase-Console, Jinja2, HTML, JS, CSS, JQuery*)
  - Implemented a Flask-Jinja2 based extendable User Study Template to conduct user studies on online services like Prolific, Amazon MTurk. Used in six user studies totalling over 700 participants.

TEACHING & SERVICE

Teaching Assistant, CSE 471 with Dr. Subbarao Kambhampati. Fall 2019
Reviewer/PC Member, ICML (2024, 2023, 2022); NeurIPS, (2023, 2022); ICLR(2024, 2023, 2022), IJCAI(2024), ICAPS, (2023, 2022, 2021); AAAI (2023, 2022), HRI (2022), BayLearn (2023) and several IEEE venues.