VISHNU TEJA KUNDE

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Skills

Frameworks	Python, PyTorch, GitHub, Hugging Face, Diffusers, Wandb, TRL, Accelerate, PEFT, LoRA
Areas of Expertise	Diffusion/flow-models, Gen AI, LLMs, diffusion LLMs, RL, transformers, in-context learning, learning theory

Selected Publications

Vishnu Teja Kunde*, Mahdi Farahbakhsh*, et al. **Inference-Time** Search using Side Information for **Diffusion**-based Image Reconstruction. *arXiv Preprint*, 2025. [Paper] [Code]. *Equal contribution.
Tools/Skills: PyTorch, diffusion models, deep learning, probabilistic methods, Bayesian inference.

- Developed a principled, training-free, inference-time search algorithm to improve the performance of diffusion-based reconstruction algorithms for inverse problems using side information.
- Improved the target metric significantly, providing better quality restoration of the ground truth images from noisy measurements.

Vishnu Teja Kunde, et al. **Transformers** are Provably Optimal **In-context** Estimators for Wireless Communications. *AISTATS*, 2025. [Paper] [Code].
Tools/Skills: PyTorch, deep learning, transformers, in-context learning, convex optimization, wireless.

- Introduced a novel framework of in-context symbol estimation using transformers in various wireless channels as context.
- Proved theoretical results on optimality and loss landscape of a single-layer softmax attention transformer.
- Demonstrated empirically the Bayesian optimality of multi-layer transformers in in-context estimation in wireless.

Research Projects

- **Diffusion LLMs**: Conducting research for improving inference-time efficiency and reasoning capabilities of diffusion LLMs using RL for step-wise denoising in the LLaDA-8B dLLM. *Tools:* dLLM, TRL, WandB, Accelerate, DeepSpeed, RL. 2025–
- **LLM for compression**: Fine-tuned the LLaMA-3.2-1B language model using parameter-efficient LoRA to enhance context-aware text compression, achieving 1.5-5% consistent improvements in compression rates across varying context lengths. *Tools:* PEFT, LoRA, PyTorch, compression. 2025
- **Transformers & in-context learning**: Trained a transformer in PyTorch to perform prediction for the belief-states of a hidden-Markov model (HMM) and compared to the optimal Baum-Welch algorithm for state prediction, suggesting a strong evidence for the generalization capability and scalability of transformers in solving complex tasks. *Tools:* PyTorch, inference, in-context learning. 2024

Education

- **Ph. D.**, Computer Engineering, ECEN, Texas A&M University, Texas, United States 2022–
- **M. Tech.**, Signal Processing, ECE, Indian Institute of Science (IISc), Bengaluru, India 2022
- **B. Tech.**, EEE, National Institute of Technology (NITW), Warangal, India 2020

Relevant Coursework

Reinforcement learning, deep Learning, analysis of algorithms, high dimensional probability, advanced convex optimization, matrix theory, random processes, linear and non-linear optimization, measure theory, real analysis, information theory.

Awards and Honors

Masters fellow, CNI, IISc | AIR-179, GATE-EE, 2020 | Merit scholarship, NITW, 2016-20 | AIR-6646, JEE-Mains, 2016