Taneesh **Gupta**

Research Fellow, Microsoft Research

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Education

Aug 2024 **Jul 2019**	**Indian Institute of Technology, (ISM) Dhanbad**	**GPA: 8.03/10**

Bachelor of Technology in Computer Science and Engineering , Bachelor of Technology in Engineering Physics

Received appreciation for the Best B.Tech Project in Computer Science and Engineering

Research Experience

Jul 2024 — Present | **Microsoft Research** — **Bangalore, India**
Research Fellow | Advisor: Dr. Xuchao Zhang

-> **Introduced Simultaneous Weighted Preference Optimization (SWEPO):** A novel method reducing alignment bias by optimizing multiple preferences with a weighted contrastive loss, achieved SOTA results on AlpacaEval datasets; Paper [Under Review].

-> **Designed Reference Alignment for multi-preference optimization (REFA):** Introduced a family of reference-free alignment methods that optimizes multiple preferences while enforcing fine-grained length control.Paper [Under Review]

-> **Developed CARMO (Context-Aware Reward Modeling):** CARMO addresses the challenges of reward hacking by generating dynamic, context-relevant evaluation to ground reward models prior to scoring.; Paper [Under Review].

-> **Introduced AMPO (Active Multi-Preference Optimization):** AMPO enhances language-model alignment beyond simple pairwise comparisons by leveraging a multi-preference group-contrastive loss and active subset selection.; Paper[Under Review].

Aug 2023 — May 2023 | **AirLab, Carnegie Mellon University** — **Pittsburgh, USA**
Researcher | Advisor: Cherie Ho, Prof. Sebastian Scherer

-> **Map It Anywhere (MIA) Data Engine for Autonomous Navigation:** Developed MIA, a data engine that uses crowd-sourced platforms to generate a dataset of 1.2 million FPV-BEV map pairs, facilitating camera-agnostic pretraining for Bird's Eye View map prediction. Achieved a 35% zero-shot performance improvement over baselines in autonomous navigation; accepted to the [Dataset and Benchmark Track, NeurIPS 2024] .

Oct 2023 — Apr 2024 | **Microsoft Research** — **Bangalore, India**
Research Intern | Advisor: Dr. Arun Iyer, Suresh Parthasarathy

-> **Developed RepoQA Dataset for Repository-Level QA:** Created a Java QA dataset using GPT-4, introducing class name obfuscation, a novel GPT-4-based evaluation for text and code, and enhancements with Retrieval Augmented Generation (RAG) and class dependency graphs to address current QA limitations.

May 2020 — Dec 2022 | **Transmute AI Research** — **Tromsø, Norway**
Researcher | Advisor: Dr. Deepak K. Gupta, Prof. Dilip K. Prasad

-> **Efficient Object Tracking on Low-Power Devices:** Designed lightweight, pruned CNN and Transformer-based object trackers for deployment on low-power devices, providing insights on architectural choices and pruning limits; Paper accepted at [ICASSP'23].

-> **Surface-Wave Velocity Profiling via Deep Learning:** Developed a deep learning model for near-surface velocity estimation using transfer learning, data augmentation, and domain adaptation, achieving competitive accuracy on field data; Journal published in [Artificial Intelligence in Geosciences (2022)].

Industry Experience

May 2023 — July 2023 | **Sprinklr** — **Gurgaon, India**
Product Engineer Intern

-> **Advancing Inference Optimization for Language Models:** Implemented state-of-the-art research on quantization, hardware optimization techniques, and model compression to enhance the inference efficiency of language models.Also worked on integrating and composing various inference optimization techniques to achieve further latency improvements.

Mar 2023 **May 2023**	**Sony Research India** *Computer Vision Intern*	**Bangalore, India**

-> **Key Scene Identification in Sports Videos Using Multimodal Attention:** Collected datasets of various sports videos for key scene identification, leveraging a pretrained 3D CNN backbone for visual feature extraction and pretrained neural networks for audio feature extraction. Employed unimodal self-attention to analyze audio and visual features for identifying highlights and integrated bimodal attention between audio and visual modalities to refine the results, achieving enhanced accuracy in highlight detection.

Dec 2021 **May 2022**	**ShareChat** *Data Scientist Intern*	**Bangalore, India**

-> **Automated Video Effects Using Audio-Driven Deep Learning:** Developed a deep learning approach to automate video effects based on the musical properties of sound. Designed an efficient Transformer-based module utilizing visual representations of audio signals to extract beat and downbeat activations, enabling precise synchronization of video effects with audio dynamics.

Publications

[C.8] **AMPO: Active Multi Preference Optimization for Self-play Preference Selection** [%]
Taneesh Gupta*, Rahul Madhavan*, Xuchao Zhang, Chetan Bansal, Saravan Rajmohan
[**Under Review**]

[C.7] **REFA: Reference Free Alignment for multi-preference optimization** [%]
Taneesh Gupta*, Rahul Madhavan*, Xuchao Zhang, Chetan Bansal, Saravan Rajmohan
[**Under Review**]

[C.6] **SWEPO: Simultaneous Weighted Preference Optimization for Group Contrastive Alignment** [%]
Taneesh Gupta*, Rahul Madhavan*, Xuchao Zhang, Chetan Bansal, Saravan Rajmohan
[**Under Review**]

[C.5] **CARMO: Dynamic Criteria Generation for Context-Aware Reward Modelling** [%]
Taneesh Gupta, Shivam Shandilya, Xuchao Zhang, Rahul Madhavan, Supriyo Ghosh, Chetan Bansal, Huaxiu Yao, Saravan Rajmohan
[**Under Review**]

[C.4] **Map It Anywhere (MIA): Empowering Bird's Eye View Mapping using Large-scale Public Data** [%]
Cherie Ho, Jiaye Zou, Omar Alama, Sai Mitheran Jagadesh Kumar, Benjamin Chiang, **Taneesh Gupta**, Chen Wang, Nikhil Keetha, Katia Sycara, Sebastian Scherer
The Thirty-Eighth Annual Conference on Neural Information Processing Systems [**NeurIPS'24**]

[C.3] **On designing light-weight object trackers through network pruning: Use CNNs or transformers?** [%]
Saksham Aggarwal*, **Taneesh Gupta***, Pawan K. Sahu*, Arnav Chavan,
Rishabh Tiwari, Dilip K. Prasad, Deepak K. Gupta
2023 IEEE International Conference on Acoustics, Speech and Signal Processing [**ICASSP'23**]

[C.2] **Near-surface velocity estimation using shear-waves and deep-learning with a U-net trained on synthetic data** [%]
Taneesh Gupta, Paul Zwartjes, Udbhav Bamba, Koustav Ghosal, Deepak K Gupta
Artificial Intelligence in Geosciences ,2022

[C.1] **Near Surface Velocity Estimation Using Surface Waves and Deep Learning** [%]
Paul Zwartjes, Deepak K Gupta, **Taneesh Gupta**
28th European Meeting of Environmental and Engineering Geophysics [**NSG2022**]

Workshop Publications

[W.1] **GPTs at Factify 2022: Prompt Aided Fact-Verification** [%]
Saksham Aggarwal*, Pawan Kumar Sahu*, **Taneesh Gupta***, Gyanendra Das*
DE-FACTIFY@AAAI 2022 [**AAAI,2022**]

Kaggle Achievements

> **G2Net Gravitational Wave Detection:** Silver Medal - 13th position among 1219 teams.

> **Lyft Motion Prediction for Autonomous Vehicles:** Silver Medal - 31st position among 937 teams.

> **SIIM-FISABIO-RSNA Covid-19 Detection::** Silver Medal - 55th position among 1305 teams.

> **PetFinder.my - Popularity prediction of shelter pet photos:** Silver Medal - 64th position among 3537 teams.

> **Google Brain - Ventilator Pressure Prediction:** Silver Medal - 129th position among 2605 teams.

> **Mechanisms of Action (MoA) Prediction**: Silver Medal - 135th position among 4373 teams.

Selected Research Projects

Preference Optimization
Advisor: Dr. Xuchao Zhang

> **Simultaneous Weighted Preference Optimization (SWEPO):** Extended DPO with a weighted contrastive loss to handle multiple responses per query, reducing alignment biases and enhancing robustness.[Paper]
> **Reference-Free Multi-Preference Optimization:** Developed a method to optimize sequence probabilities with EOS regularization, improving response quality and controlling length.[Paper]

Resource Efficient Machine Learning
Advisor: Dr. Deepak K. Gupta

> **Ultra-Lightweight Object Trackers:** Developed highly compressed trackers using CNN/Transformer pruning, enabling efficient deployment on low-power devices.
> **Performance:** Achieved extreme compression (up to 99%) while maintaining stability, providing insights on optimal architectures for efficient tracking.
> **Comparative Analysis:** Conducted in-depth studies on CNN, Transformer, and hybrid models to evaluate performance under high compression conditions. [ICASSP'23]

Selected Honors and Awards

> **Kaggle Competitions Expert**: Achieved a top global rank of 655 out of 200,000 competitors worldwide. [Profile]
> **Winner** of first ever national level **Amazon ML Challenge 2021** with over 3k+ participating teams, received an internship offer and a cash price of 1 lakhs INR.
> **Kaggle Days Championship 2022 World Finals**: Qualified and Invited for Final held in Barcelona
> **Received Scholarship** to attend Naamii 2022, the second Nepal Winter School of AI held at Pokhara, Nepal; awarded to international students with exceptional profile.

Notable Positions of Responsibility

> **Senior Member** at Cyber Labs, the official cyber society of IIT (ISM), Dhanbad   2019-24

Key Courses Undertaken

Machine Learning	Deep Learning Specialization (Deeplearning.ai), CS231n (Stanford University), CS224N (Stanford University), Machine Learning (Stanford University, AndrewNg)
CS and Maths	Data Structures and Algorithms, Discrete Mathematics, Linear Algebra, Numerical Methods, Pattern Recognition, Statistical Methods

References

> **Xuchao Zhang** - Principal Researcher, Microsoft [Website],
> **Ayush Choure** - Principal Researcher, Microsoft
> **Srikant Bharadwaj** - Principal Researcher, Microsoft [Website]
> **Chetan Bansal** - Senior Principal Research Manager, Microsoft [Website]
> **Arun Iyer** - Principal Researcher, Microsoft Research India [Website]