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Nasib Ullah

Education

Feb 2023-2027 **Doctor of Philosophy** *Computer Science Department*
Aalto University, Finland
Doctoral Thesis Topic: Hardware efficient Deep Learning for Extreme-scale Classification.

May 2018 **Master of Technology,** *Machine Learning and Computing.*
Indian Institute of Space Science and Technology, Department of Space, Govt. of India.
Master Thesis: Video to Text in the wild.
GPA – 8.93/10

January 2014 **Bachelor of Technology,** *Electronics and Communication Engineering.*
West Bengal University of Technology, India.
Undergraduate Research: Image processing based road traffic security system.
GPA – 8.32/10

Research Interests

My research interest centers on optimizing machine learning models for efficient memory and compute usage, particularly in addressing challenges of extreme classification and deep learning tasks with large output spaces, notably handling datasets with missing or noisy labels. Areas of interest include:

- Methods for precision and scalability in extreme classification.
- Low precision training for extreme classification models.
- Enhancing memory efficiency through the adoption of dynamic sparse training techniques.
- Exploring synergies between extreme classification and large language models (LLMs) to efficiently tackle large-vocabulary inference scenarios.

Academic Projects

Feb 2023–Ongoing **Scalable and Robust Representation Learning in Large output Spaces** *Aalto University,Finland.*

- Working on memory-efficient, end-to-end low-precision (8-bit) and sparse training techniques for deep learning models with extreme label spaces, enabling the training of models with up to 3 million labels on commodity hardware accelerators through the design of specialized CUDA kernels.
- Working on evaluating the calibration properties of specialized deep learning models for large label spaces, known as extreme classification models, to assess their predictive reliability and accuracy.
- Working on inference efficiency for large-vocabulary language models (LLMs), reducing latency and memory overhead in speculative decoding.

Dec 2021–Dec 2022 **Facial Expressions and Ambivalence Detection in eHealth Applications** *École de technologie supérieure ÉTS, Montreal,Canada.*

- Collaborated in designing specific attention models that integrate audio and visual data for nuanced emotion recognition, which led to our joint work being published in *A Joint Cross-Attention Model for Audio-Visual Fusion in Dimensional Emotion Recognition* at CVPRW 2022.

Oct 2019–Dec 2021 **Multiple activity recognition and captioning in unconstrained videos** *ECSU, Indian Statistical Institute, India*

- Investigated the hallucination phenomenon in video captioning models, developing mitigation strategies, and published the findings in a paper titled *Thinking Hallucination for Video Captioning* at ACCV 2022.
- Developed model-based dynamic surrogate loss functions to address non-differentiable metrics like BLEU, leading to the paper *Boosting Video Captioning with Dynamic Loss Function.*

Masters Thesis

Video to Text in the Wild *Prof. S. Sumitra, IIST*

- Developed a scalable video captioning system by extracting keyframes and leveraging robust image captioning methods, addressing domain-specific constraints, exposure bias, and optimization of non-differentiable metrics via policy gradients.

Experience

May 2026– September 2026

Qualcomm AI Research, Amsterdam.

Deep Learning Research Intern

- Worked on Residual quantization and dynamic mixed precision based moe compression with efficient caching for edge devices.

2023– 2026

Aalto University, Helsinki, Department of Computer Science.

Teaching Assistant

- CS-E4580 - Programming Parallel Computers, 14.4.2025-30.5.2025
- CS-C3240 - Machine Learning, 2.9.2024-13.12.2024
- CS-C3240 - Machine Learning, 4.9.2023-13.10.2023

Oct 2019– Dec 2021

Indian Statistical Institute, Kolkata, ECSU LAB.

Project Linked Person

- Led the "Multiple Activity Recognition and Captioning in Unconstrained Videos" project, focusing on enhancing video understanding and descriptive capabilities in complex environments.
- Delivered tutorials and practical sessions at the Winter School on Deep Learning (WSDL2022), focusing on the latest advancements and techniques in the field.

Aug 2019– October 2022

UpGrad.

Thesis Supervisor

- Supervised over 50 Master's students in Data Science and Machine Learning, guiding their thesis projects in collaboration with Liverpool John Moores University (LJMU).

June 2018– July 2019

Flytxt Mobile Solutions Pvt Ltd.

Deputy Data Science Manager

- Engaged in the "Job Description Based Resume Filtering Using NLP" initiative, utilizing natural language processing techniques to assess and select candidates for interviews based on their resume details.
- Contributed to the ROBO-X project, an AI Companion for Marketers, by creating a generative model designed to replicate customer data.

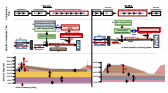
Selected Publications

HSEARCH-R1: Learning Compact Value Models for LLM-guided Hierarchical Search via RL
*Nilesh Gupta, **Nasib Ullah**, Jinbin Zhang, Rohit Babbar, Inderjit S Dhillon*
EMNLP 2026

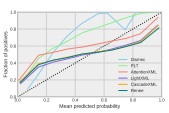


DynaSpec: Context-aware Dynamic Speculative Sampling for Large-Vocabulary Language Models
*Jinbin Zhang, **Nasib Ullah**, Erik Schultheis, Rohit Babbar.*
[Preprint]

Hardware-Aware Dynamic Sparse Training for Large Output Spaces
***Nasib Ullah**, Jinbin Zhang, Jean Lucien Randrianantenaina, Erik Schultheis, Rohit Babbar.*
Forty-third International Conference on Machine Learning, **ICML, 2026**, Seoul, South Korea. [Paper]



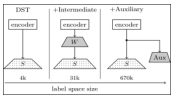
ELMO : Efficiency via Low-precision and Peak Memory Optimization in Large Output Spaces
Jinbin Zhang, **Nasib Ullah***, Erik Schultheis, Rohit Babbar.*
Forty-second International Conference on Machine Learning, **ICML, 2025**, Vancouver, Canada. [Paper]



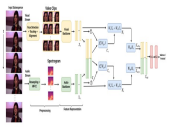
Labels in Extremes: How Well Calibrated are Extreme Multi-label Classifiers?
***Nasib Ullah**, Erik Schultheis, Jinbin Zhang, Rohit Babbar.*
31st ACM SIGKDD Conference on Knowledge Discovery and Data Mining, **KDD, 2025**, Toronto, Canada. [Paper]



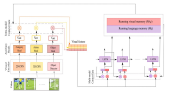
Large Language Model as a Teacher for Zero-shot Tagging at Extreme Scales
Jinbin Zhang, ***Nasib Ullah****, Rohit Babbar.*
31st International Conference on Computational Linguistics, **COLING, 2025**, Abu-Dhabi, UAE [Paper]



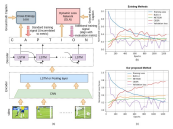
Navigating Extremes: Dynamic Sparse Training for Large Output Spaces
Nasib Ullah*, Erik Schultheis, Mike Lasby, Yani Ioannou, Rohit Babbar.*
38th Conference on Neural Information Processing Systems (**NeurIPS 2024**), Vancouver, Canada. [Paper]



A Joint Cross-Attention Model for Audio-Visual Fusion in Dimensional Emotion Recognition
Gnana Praveen Rajasekar, Wheidima Carneiro de Melo, ***Nasib Ullah****, Haseeb Aslam, Osama Zeeshan, Théo Denorme, Marco Pedersoli, Alessandro Koerich, Patrick Cardinal, Eric Granger.*
Published in the Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2022. [Paper]



Thinking Hallucination for Video Captioning.
Nasib Ullah*, Partha Pratim Mohanta.*
Accepted to the Asian Conference on Computer Vision (**ACCV**), 2022. [Paper]



Boosting Video Captioning with Dynamic Loss Network
Nasib Ullah*, Partha Pratim Mohanta.*
[Paper]

Awards and Honors

- ICML 2026: Gold reviewer.
- KDD 2025: Recipient of Student Travel Award.
- Aalto SCI award: Teaching Assistants of the Year 2023.
- Ranked 6th on CVPR 2022 3rd Workshop and Competition on Affective Behavior Analysis in-the-wild (ABAW).
- Achieved a top 3.8% ranking among 172,714 students, securing a 96.2 percentile in the GATE (Graduate Aptitude Test in Engineering).

Academic Service

- Reviewer for NeurIPS 2025, ICLR 2026, ICML 2026, AAAI 2027, TMLR.
- Student Volunteer, KDD 2025.

Technical Skills

Languages	Python, C/C++
Frameworks	PyTorch, Keras, OpenCV, Numpy, Cuda, Triton
WebD	HTML/CSS, JavaScript, Django
Utilities	Anaconda, Git, LaTeX, Jupyter Notebook

Relevant Courses

Online	Convolutional Neural Networks for Visual Recognition, Deep Learning for NLP, Deep Learning.Ai Specialization
Classroom	Programming Parallel Computers, Deep Learning, Machine Learning: Supervised Methods, Matrix Computation, Discrete Mathematics, Applied Statistics, Optimization Techniques, Data Mining, Pattern Recognition and Machine Learning, Evolutionary and Natural Computing, Artificial Neural Network, Reinforcement Learning, Computer Modeling and Simulation.

Personal Profile

Languages Known	English, Bengali (Native), Hindi

References

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