REBATI RAMAN GAIRE

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EXPERIENCE

Machine Learning Research Specialist Feb 2025 – Present
University of Illinois Chicago Chicago, Illinois

- Brainstorming, developing, and implementing novel machine learning algorithms optimized for hardware applications, focusing on energy efficiency and computational performance.
- Managing and analyzing datasets, preparing data for experiments, and ensuring data integrity for research studies.
- Maintaining and troubleshooting hardware setups and software environments for machine learning projects.
- Assisting in writing research proposals, grant requests, manuscript preparation, and presentations.

Graduate Research Assistant Jan 2023 – Dec 2024
School of Computing, University of Nebraska-Lincoln Lincoln, NE

- Led pioneering research on compressing deep learning models with integrated active learning, achieving a notable improvement in accuracy of 3.62% while reducing up to 40% labeled training samples.
- Achieved a 5× reduction in computation and inference latency with the proposed compression technique, ensuring the delivery of robust and scalable solutions for edge devices.
- Published and presented research at peer-reviewed journals and conferences, including ICMLA 2023 and TETC 2024.

Machine Learning Engineer - Computer Vision Apr 2021 – Dec 2022
Redev Technology, Remote London, UK

- Orchestrated the implementation of deep learning solutions for expensive image annotation, resulting in a remarkable reduction of up to 30% in annotation costs for complex computer vision applications.
- Spearheaded the development of a scalable deep learning infrastructure for workplace safety monitoring, achieving robust detection across diverse environmental conditions, including geography, occlusion, lighting, and weather scenarios.[Project]

Computer Vision Research Engineer Apr 2021 – Dec 2022
NAAMII Kathmandu, Nepal

- Secured first place in the EndoVis FetReg challenge at MICCAI 2021, with a novel self-supervised medical image segmentation framework, improving the performance of UNet and U2Net by 2.5%.
- Successfully collaborated with multiple researchers on pioneering research in advanced deep federated learning techniques for cross-domain surgical image segmentation.
- Published research in the Medical Image Analysis Journal and CVPR Conference.

Software Developer Intern May 2019 – Nov 2019
UBL R&D Center Lalitpur, Nepal

- Developed a full-stack web application with an integrated image annotation tool and user management platform, providing multiple user privileges (upload, annotate, verify) and streamlining workflow efficiency by up to 30%.
- Adapted AWS services for training, storage, and deployment of a prediction module, increasing the annotation speed from 40 to 70 samples per hour.[Project]

PUBLICATIONS

1. **R. Gaire**, A. Roohi, "FDAL: Leveraging Feature Distillation for Efficient and Task-Aware Active Learning," ECLR ICCV 2025.
2. **R. Gaire**, A. Roohi, "CARN: Complexity-Aware Routing Network for Efficient and Adaptive Inference," eLVM CVPR 2025.
3. **R. Gaire**, S. Tabrizchi, A Roohi, "Resource-Efficient Adaptive-Network Inference Framework with Knowledge Distillation-Based Unified Learning", ISVLSI 2024.
4. **R. Gaire**, S. Tabrizchi, A Roohi, "DECO: Dynamic Energy-aware Compression and Optimization for In-Memory Neural Networks", MWASCAS 2024.
5. S. Tabrizchi, **R. Gaire**, S Angizi, A Roohi, "APRIS: Approximate Processing ReRAM In-Sensor Architecture Enabling Artificial-Intelligence-Powered Edge", IEEE Transactions on Emerging Topics in Computing (TETC 2024).
6. **R. Gaire**, S. Tabrizchi, A Roohi, "EnCoDe: Enhancing Compressed Deep Learning Models through Feature Distillation and Informative Sample Selection", ICMLA 2023.
7. S. Tabrizchi, **R. Gaire**, S Angizi, A Roohi, "SenTer: A Reconfigurable Processing-in-Sensor Architecture Enabling Efficient Ternary MLP", GLSVLSI 2023.
8. M Eisenmann, ..., **R. Gaire**, and others, "Why is the winner the best?", CVPR 2023.

9. B. Bhattarai[+], R. Subedi[*], **R. Gaire[*]**, E. Vazquez, D. Stoyanov, "Histogram of Oriented Gradients Meet Deep Learning: A Novel Multi-task Deep Network for Medical Image Semantic Segmentation", Medical Image Analysis Journal.
10. R. Subedi, **R. Gaire**, B. Bhattarai[+], D. Stoyanov, "A Client-server Deep Federated Learning for Cross-domain Surgical Image Segmentation", DEMI MICCAI 2023.
11. S Bano, ..., **R. Gaire**, and others, "FetReg2021: A Challenge on Placental Vessel Segmentation and Registration in Fetoscopy", Medical Image Analysis Journal.
12. **R. Gaire[*]**, R. Subedi[*], A. Sharma, S. Subedi, , S. K. Ghimire[+], S. Shakya, "GAN-Based Two-Step Pipeline For Real-World Image Super-Resolution", ICTIS 2021.

SKILLS

ML & DL Frameworks	PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy, SciPy, NLTK
Programming & Scripting	Python, JavaScript, C/C++, SQL, Matlab
MLOps & Deployment	MLflow, Docker, Kubernetes, Apache Airflow, AWS SageMaker, TensorFlow Serving
Web Development	Django, Flask, ReactJS, NodeJS
Tools & Platforms	AWS, Linux, Git, Roboflow, LaTeX, WandB

EDUCATION

MS in Computer Science, University of Nebraska-Lincoln Jan 2023 – Dec 2024
Thesis topic: Not All Samples Are Created Equal: Task-Aware Informative Sampling and Adaptive Inference for Efficient Edge AI
Courses: Design and Analysis of Algorithms, Deep Learning, Advanced Software Engineering, Computer Architecture, Hardware-Software Acceleration for Machine Learning, Natural Language Processing

BE in Computer Engineering, TU, IOE, Pulchowk Campus Nov 2016 – Apr 2021
Thesis topic: Multi-stage Generative Adversarial Networks (GANs) for Real-Image Super-Resolution
Courses: Computer Programming in C, Object Oriented Programming with C++, Theory of Computation, Data Structure and Algorithm, Discrete Mathematics, Calculus-I, Calculus-II, Probability and Statistics, Object Oriented Analysis and Design, Artificial Intelligence, Database Management System, Distributed System, Computer Networks and Security, Digital Signal Analysis and Processing, Simulation and Modeling, Internet and Intranet, Information System

PROJECTS

SourceLens: LLM-Powered Codebase Navigator
- Engineered a semantic code exploration tool to accelerate large-scale codebase understanding using CodeBERT embeddings, Tree-sitter parsing, FAISS indexing, and retrieval-augmented prompting.

ClauseAI: AI-Driven Contract Risk Analyzer
- Architected an AI system to interpret and assess legal risk in contract clauses by leveraging GPT-4, LangChain, FAISS, and the CUAD dataset for clause extraction, semantic retrieval, and context-aware rewrites.

Real-World Image Super-Resolution with GANs
- Pioneered a multi-stage GAN model to restore real-world low-resolution images, surpassing existing methods with a 4.41% gain in perceptual quality; deployed the pipeline via Flask, React, TensorFlow Serving, and Docker.

ACHIEVEMENTS

- Recipient of the "Outstanding Master's Thesis Award" by the College of Engineering, University of Nebraska–Lincoln.
- Presented peer-reviewed research at ICCV 2025, CVPR 2025, MWSCAS 2024, and ICMLA 2023.
- Recipient of the "Most Improved Master's Student Award" by the School of Computing, University of Nebraska–Lincoln.
- Full financial support for MS in Computer Science at the University of Nebraska-Lincoln.
- Secured first place in the EndoVis Fetreg challenge at MICCAI 2021 among 35 global teams.
- Selected scholar for the prestigious PAISS 2021 (PRAIRIE / MIAI AI Summer School).
- Ranked 14th/12,000 in Nepal's IOE nationwide entrance exam; awarded full merit-based undergraduate scholarship.