

REBATI RAMAN GAIRE

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EDUCATION

MS in Computer Science, University of Nebraska-Lincoln Jan 2023 – Dec 2024

Thesis topic: On-device Incremental Learning with Informative Sample Selection

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

EXPERIENCE

Graduate Research Assistant Jan 2023 – Present
School of Computing, UNL Lincoln, NE

- Conceptualized, implemented, and 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.[Paper]
- 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.[Project]

Software Engineer - Computer Vision Apr 2021 – Dec 2022
Redev Technology 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 Researcher May 2019 – Nov 2019
NAAMII Kathmandu, Nepal

- Introduced a novel self-supervised multi-task learning framework for medical image semantic segmentation, demonstrating a notable performance boost of up to 2.5% in popular models like UNet and U2Net.[Paper][Project]
- Successfully collaborated with multiple researchers on pioneering research in advanced deep federated learning techniques for cross-domain surgical image segmentation.[Paper]

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. R. Gaire**, S. Tabrizchi, A Roohi, “EnCoDe: Enhancing Compressed Deep Learning Models through Feature Distillation and Informative Sample Selection”, ICMLA 2023. <https://doi.org/10.1109/ICMLA58977.2023.00093>
2. S. Tabrizchi, **R. R. Gaire**, S Angizi, A Roohi, “SenTer: A Reconfigurable Processing-in-Sensor Architecture Enabling Efficient Ternary MLP”, GLSVLSI 2023. <https://doi.org/10.1145/3583781.3590225>
3. M Eisenmann, ..., **R. R. Gaire**, and others, “Why is the winner the best?”, CVPR 2023. <https://doi.org/10.48550/arXiv.2303.1771>
4. B. Bhattarai⁺, R. Subedi^{*}, **R. 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. <https://doi.org/10.1016/j.media.2023.102747>
5. R. Subedi, **R. R. Gaire**, B. Bhattarai⁺, D. Stoyanov, “A Client-server Deep Federated Learning for Cross-domain Surgical Image Segmentation”, DEMI MICCAI 2023. <https://doi.org/10.48550/arXiv.2306.08720>

6. S Bano, ..., **R. R. Gaire**, and others, “FetReg2021: A Challenge on Placental Vessel Segmentation and Registration in Fetoscopy”, Medical Image Analysis Journal. <https://doi.org/10.48550/arXiv.2206.12512>
7. **R. R. Gaire**^{*}, R. Subedi^{*}, A. Sharma, S. Subedi, , S. K. Ghimire⁺, S. Shakya, “GAN-Based Two-Step Pipeline For Real-World Image Super-Resolution”, ICT with Intelligent Applications, SIST series, vol 248. Springer, Singapore. <https://doi.org/10.1007/978-981-16-4177-0-75>

SKILLS

Programming Language	Python, JavaScript, C/C++, SQL, Matlab
Web Framework	Django, Flask, ReactJS, NodeJS
ML Framework	PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy, SciPy, NLTK
Other Tools	Linux, Git, Docker, Tensorflow Serving, AWS, GCP, LateX

PROJECTS

Real-ImageSR

- Led and presented a project at a peer-reviewed conference on enhancing low-resolution images with a multi-stage Generative Adversarial Network (GAN), achieving 4.41% improvement in perceptual quality metric compared to leading approaches.[Code]
- Designed and crafted a web application with a ReactJS frontend and a Flask and TensorFlow Serving with Docker in the backend to serve a model that performs 4× image super-resolution with high efficiency and scalability.[Code]

Document Automator

- Designed and implemented a centralized PostgreSQL database managing over 10,000 records for MSc programs, students, and faculties at DOECE, IOE, Pulchowk Campus, streamlining data storage, management, and accessibility.
- Engineered a Django-based web application to automate MSc thesis document generation and management, achieving a 50% increase in operational efficiency for program coordinators.[Code]

ACHIEVEMENTS

- Published four conference papers and two journal papers, amassing over 55 citations.[Google Scholar]
- Awarded the “Most Improved Master’s Student” by the School of Computing at UNL.[Certificate]
- Secured first place in the EndoVis Fetreg challenge at MICCAI 2021.[Certificate]
- Granted a scholarship to attend the prestigious PRAIRIE / MIAI AI Summer School (PAISS) 2021.[Certificate]
- Ranked 14th out of over 12,000 candidates in IOE’s Nationwide BE Entrance Exam, earning a merit-based scholarship for undergraduate studies in Computer Engineering.

EXTRA-CURRICULAR

Project Mentor

Forth National Workshop on Machine Learning and Data Science

Oct 2021
Kathmandu, Nepal

- Taught fundamentals of programming, machine learning, deep learning, and guided undergraduate and post-graduate students to computer vision projects.

Software Instructor

LOCUS 2020, National Technical Exhibition

Jun 2020
Lalitpur, Nepal

- Volunteered as a software Instructor to teach programming concepts to junior students.

Football Player

IOE, Pulchowk Football Club

2017 – 2021
Lalitpur, Nepal

- Played for college senior team and won some major inter-college football tournaments in Nepal.