

PRANAV POUDEL

Kathmandu, Nepal

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Education

Institute of Engineering, Pulchowk Campus, Tribhuvan University

Nov. 2017 – March 2022

Bachelor of Engineering in Computer Engineering

Lalitpur, Nepal

- Ranked **106th** in Entrance Exam 2074 BS out of nearly 18000 applicants. (*Top 0.5%*)
- Graduated with **First Division**, achieving **75.87%**.

Publications and Pre-prints

- CAR-MFL: Cross-Modal Augmentation by Retrieval for Multimodal Federated Learning with Missing Modalities**
Pranav Poudel, Prashant Shrestha*, Sanskar Amagain*, Yash Raj Shrestha, Prashanna Gyawali, Binod Bhattarai
International Conference On Medical Image Computing & Computer Assisted Intervention (MICCAI), 2024 [[Paper](#)]
- Task-Aware Active Learning for Endoscopic Polyp Segmentation.**
Pranav Poudel*, Shrawan Kumar Thapa*, Sudarshan Regmi, Binod Bhattarai, Danial Stoyanov
Workshop on Data Engineering in Medical Imaging (DEMI), MICCAI 2024 [[Paper](#)]
- Neural Network Pruning for Real-Time Polyp Segmentation. Medical Image Understanding and Analysis.**
Suman Sapkota, Pranav Poudel, Sudarshan Regmi, Bibek Panthi, Binod Bhattarai
Annual Conference in Medical Image Understanding and Analysis (MIUA), 2023 [[Paper](#)]
- CholecTriplet2022: Show me a tool and tell me the triplet — An endoscopic vision challenge for surgical action triplet detection.**
Chinedu Innocent Nwoye, ..., Pranav Poudel, Binod Bhattarai, ..., Nicolas Padoy
Medical Image Analysis (MedAI), 2023 [[Paper](#)]
- Multimodal Federated Learning in Healthcare: a review.**
Jacob Thrasher, Alina Devkota, Prasiddha Siwakotai, Rohit Chivukula, Pranav Poudel, Chaunbo Hu, Binod Bhattarai, Prashanna Gyawali
arxiv preprint [[Paper](#)]

Research Experience

Multimodal Learning Lab (MMLL)

July 2022 – present

Research Assistant (part-time) | Supervisor: Dr. Binod Bhattarai

University of Aberdeen, UK

- Developed the novel data augmentation method based on retrieval for tackling missing modalities in multimodal federated learning.
- Worked on pruning a convolution-based network for polyp segmentation, where the importance scores of filters was calculated using Taylor First Order (TaylorFO) approximation to estimate how the network output changes when specific filters are removed. Experiment was done on KVASIR datasets and UNet.
- Developed a plug-and-play method that utilizes label co-occurrences for multi-label classification of surgical action triplets, treating it as a graph and applying online multi-task learning.
- Enhanced the results through temporal smoothing post-processing steps, leading to a *5th* rank in the MICCAI challenge despite low parameters count and simple architecture.
- Assisted team in developing Polyp Segmentation method that uses Variance of Gradients (VoGs) to approximate near-OOD likelihood, aiding in the categorization of training samples into ID and near-OOD categories. Experiment was done on Datasets: KVASIR, CVC and Models: UNet, PRANet, CANet and UACANet. [[PDF](#)]

NepAI Applied Mathematics and Informatics Institute

Aug 2021 – October 2021

Research Intern | Supervisor: Dr. Binod Bhattarai

Lalitpur, Nepal

- Proposed innovative approach that combines CoreSet for diversity and the Best vs. Second best margin for uncertainty, aiming to improve the active learning process for Endoscopic Image Analysis.
- Trained and performed ablation study on generative models and super-resolution models for brand labels.

Industrial Experience

Fogsphere (Redev AI Ltd), UK

April 2022 – present

Computer Vision Engineer

Remote

- Currently working on multi modal LLM at edge.
- Developed and deployed an active learning solution that utilizes the Core-set method, Gaussian Mixture Model (GMM) and Uncertainty based method to assist in annotating object detection data.
- Created a system for estimating vehicle speed by employing a YOLO object detector, homography estimation, and object tracker.
- Developed and successfully deployed a solution to detect electric sparks from CCTV footage, with the goal of preventing fires in construction sites.
- Solution was based on both audio and video data where Template matching was performed for audio data and CNN based solution was deployed for Video data.

LIS Nepal Pvt. Ltd. - A Yomari Company

Oct 2021 – Apr 2022

Software Engineering Intern, ML (part-time)

Lalitpur District, Nepal · Hybrid

- Created and Deployed Search Engine based on Semantic Textual Similarity.

ASMI Corp, USA

May 2019 – Mar 2020

Junior Researcher (part-time)

Remote

- Conducted research on two-dimensional in-video advertising, a method aimed at enabling businesses to distribute advertisements within videos seamlessly without disrupting the video content.

Academic Projects

Sequenced modeling Based Search System | *Graduating Capstone Project* [\[PDF\]](#)

March 2022

- Proposed the Information Bottleneck-SimCSE framework, which significantly improved sentence representations in unsupervised training.
- Enhancement was evidenced by achieving a Spearman coefficient of **77.32**, surpassing the previous score of **76.25** on the SimCSE Semantic Textual Similarity Datasets.
- Implemented Wav2Vec2.0 for speech recognition module. With addition from model obtained using IB-SimCSE, voice-based search system was developed for e-commerce applications using Semantic Textual Similarity.

Bi-directional Translation Between MRI and CT | *Minor Capstone Project* [\[PDF\]](#)

March 2021

- Developed a generative model that enables bi-directional translation between MRI and CT images using Cycle-GAN, specifically the U-GAT-IT architecture.
- Conducted ablation studies to investigate the impact of different loss functions, including CAM loss, Identity loss, Hinge loss, and others.

American Sign Language Detection | *Instrumentation II Capstone Project*

January 2020

- Developed CNN based model to detect American sign language in real-time and deployed in Raspberry Pi 3.

Professional Service

Reviewer, Workshop on Data Engineering in Medical Imaging, MICCAI, 2024

Scholarships

F.F. STIP Scholarships

NAAMII Second Winter AI School Scholarship Holder 2020

Fusemachines Artificial Intelligence Scholarship Program 2019

Achievement Award, Trinity International College (Mathematics 98/100, Grade XII)

Teaching Experience

4th Annual Nepal AI School (ANAIIS)

May 22 - June 1 2023

Teaching Assistant

Certificate

- Acted as Lead Instructor and Designed Lab Session on Active Learning and Data Augmentation under supervision of Binod Bhattarai, PhD.
- Instructor on Lab Session designed by Federico Barbero and Jacob Bamberger (PhD Candidates, Oxford University) on Graph Neural Network.
- Instructor on Lab Session designed by François Rameau, PhD.

- Member of the Selection Committee for selecting national applicants in the self-funded category.

Third Winter AI School

December 20 - 30 2021

Teaching Asistant

Certificate

- Assisted and guided participants on Labs through hands-on exercise on Adversarial Discriminative Domain Adaptation under supervision of Danda Pani Poudel, PhD.

Locus 2021 Software Fellowship

Instructor

- Delivered lecture on Software Debugging and testing along with demonstration using python.

GIT Workshop 2019

Lead Instructor

- Designed Workshop and Delivered lecture on Version control using GIT.