PRANAV POUDEL

Kathmandu, Nepal

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Education

Institue of Engineering, Pulchowk Campus, Tribhuvan University

Bachelor of Engineering in Computer Engineering

- 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, Prashnna 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. Suman Sapkota, Pranav Poudel, Sudarshan Regmi, Bibek Panthi, Binod Bhattarai Anunal 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, Prashnna Gyawali arxiv preprint [Paper]

Research Experience

Multimodal Learning Lab (MMLL)

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

- 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]

NepAl Applied Mathematics and Informatics Institute

Research Intern | Supervisor: Dr.Binod Bhattarai

- 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 abalation study on generative models and super-resolution models for brand labels.

July 2022 – present

University of Aberdeen, UK

Aug 2021 – October 2021

Lalitpur, Nepal

Nov. 2017 - March 2022 Laltipur, Nepal

Industrial Experience

Fogsphere (Redev AI Ltd), UK

Computer Vision Engineer

- 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

Software Engineering Intern, ML (part-time)

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

ASMI Corp, USA

Junior Reseacher (part-time)

• 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]

- 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]

- 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

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

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)

Professional Service

Reviewer, Workshop on Data Engineering in Medical Imaging, MICCAI, 2024 Logistic Manager, IEEE Pulchowk Student Branch 2021 Lead Organizer, Data Rush: AI and Data Science Competition, LOCUS 2021 Campus Captain, Mozilla Campus Club Pulchowk Branch 2018

April 2022 – present Remote

Oct 2021 – Apr 2022 Lalitpur District, Nepal · Hybrid

May 2019 – Mar 2020

Remote

March 2021

March 2022

January 2020

Teaching Experience

4th Annual Nepal AI School (ANAIS)

 $Teaching \ Asistant$

- 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

 $Teaching \ Asistant$

• 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.

December 20 - 30 2021

Certificate

Certificate

May 22 - June 1 2023