Pranav Poudel

Kathmandu, Nepal
Pranav Poudel | poudelpranav@gmail.com | linkedin.com/in/pranavpoudel | github.com/Salamander321

Education

Institue of Engineering, Pulchowk Campus, Tribhuvan University **Nov. 2017 – March 2022**
Bachelor of Engineering in Computer Engineering *Laltipur, Nepal*

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

Research Experience

Multimodal Learning Lab (MMLL) **May 2022 – present**
Research Assistant (part-time) | Supervisor: Dr.Binod Bhattarai *University of Aberdeen, UK*

- 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 5^{th} 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]**
- 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.
- Currently leading a project on Federated Learning for healthcare applications. Working on a knowledge transfer methodology and the Mimic-CXR dataset.

NepAl 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.

Publications

- Sapkota, S., **Poudel, P.**, Regmi, S., Panthi, B., Bhattarai, B. (2024). Neural Network Pruning for Real-Time Polyp Segmentation. Medical Image Understanding and Analysis.Lecture Notes in Computer Science, vol 14122. Springer, Cham. **[Paper]**
- Nwoye, C. I., Yu, T., Sharma, ... **Poudel, P.** ... ,Padoy, N. (2023). CholecTriplet2022: Show me a tool and tell me the triplet — An endoscopic vision challenge for surgical action triplet detection. Medical Image Analysis, 89, 102888. doi:10.1016/j.media.2023.102888 **[Paper]**
- Thapa, S. K.*, **Poudel, P.***, Regmi, S., Bhattarai, B., Stoyanov, D. (2023). Task-Aware Active Learning for Endoscopic Polyp Segmentation. Under-review, IEEE T-MRB **[Paper]**
- Thrasher, J., Devkota, A., Siwakotai, P., Chivukula, R., **Poudel, P.**, Hu, C., Bhattarai, B. and Gyawali, P., (2023). Multimodal Federated Learning in Healthcare: a review. arXiv preprint arXiv:2310.09650. **[Paper]**

Professional Experience

Fogsphere (Redev AI Ltd), UK **April 2022 – present**
Computer Vision Engineer *Remote*

- 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.
- Created a system for estimating vehicle speed by employing a YOLO object detector, homography estimation, and object tracker.
- Developed and implemented an active learning solution that utilizes the Core-set method and Gaussian Mixture Model (GMM) to assist in annotating object detection 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 Reseacher (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.

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 in NIFTI datasets

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.

Teaching Experience

4th Annual Nepal AI School (ANAIS) **May 22 - June 1 2023**

Teaching Asistant *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.

Relevant Coursework

- AI in Medicine
- Algorithms Analysis
- Artificial Intelligence
- Image Processing
- Data Structures
- Database Management
- Distributed System
- Machine Learning

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)