Sanjay Bhandari

Kathmandu, Nepal
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Education

Institue of Engineering, Pulchowk Campus, Tribhuvan University **Oct 2018 – Mar 2023**
Bachelor of Engineering in Computer Engineering *Laltipur, Nepal*

- Ranked **250th** in Entrance Exam 2075 BS out of nearly 18000 applicants.*(Top 0.5%)*
- Graduated with **First Division**, achieving **79.38%**.

Research Experience

NepAl Applied Mathematics and Informatics Institute **May 2023 – present**
Research Assistant (Part-time) | Supervisor: Dr.Binod Bhattarai *Lalitpur, Nepal*

- **Developed an instance segmentation model for Automatic Region-Based Coronary Artery Stenosis Detection**
  - Achieved 2nd position in the ARCADE challenge at MICCAI 2023 despite utilizing a simple architecture.
- **Innovative Out-of-Distribution (OOD) Detection in Gastrointestinal Images**
  - Developed a plug-and-play distance-based method for OOD detection, outperforming state-of-the-art methods. Conducted experiments on KVASIR and GastroVision datasets to validate the approach.
- **Test Time Augmentation for OOD Detection**
  - Created a plug-and-play test time augmentation-based OOD detection method, which significantly improved the performance of all previous OOD detection techniques.
- **Developing Multimodal OOD Detection Method for Gastrointestinal images**
  - Currently leading the project for Multimodel OOD detection method for Gastrointestinal images using the help of the contents of the KVASIR dataset and synthetic texts generated by LLM.

NepAl Applied Mathematics and Informatics Institute **Jun 2020 – Apr 2023**
Research Intern | Supervisor: Dr.Binod Bhattarai *Lalitpur, Nepal*

- Minor research activities involving literature review, data labeling, performing experiments, and assisting supervisors in brainstorming research ideas.

Publications

- **Bhandari, S.***, Pokhrel, S.*, Ali, S., ... Bhattarai, B., (2024). NCDD: Nearest Centroid Distance Deficit for Out-Of-Distribution (OOD) Detection in Gastrointestional Vision. **[Paper]**
- **Bhandari, S.***, Pokhrel, S.*, Vazquez, E., ... Bhattarai, B., (2023). Convnextv2 fusion with mask R-CNN for automatic region based coronary artery stenosis detection for disease diagnosis. arXiv preprint arXiv:2310.04749. **[Paper]**
- **Bhandari, S.***, Pokhrel, S.*, Vazquez, E., ... Bhattarai, B., (2023). Data Augmentation through Pseudolabels in Automatic Region Based Coronary Artery Segmentation for Disease Diagnosis. arXiv preprint arXiv:2310.05990. **[Paper]**

Professional Experience

Fogsphere (Redev AI Ltd), UK **Jan 2023 – present**
Computer Vision Engineer *Full time, Remote*

- Developed a deep learning pipeline for person and vehicle detection and tracking, encompassing data collection, preprocessing, training, and optimization.
- Developed and implemented a face recognition system to identify intruders in indoor environments.
- Developed an advanced alarm system for construction and industrial sites that enhances workplace safety by detecting human falls and intruders climbing through the use of object detection and pose estimation.

Rara Labs, Nepal **Jan 2023 – Mar 2023**
Computer Vision Research Engineer *Remote*

- Developed an anomaly detection system for detecting anomalies in public and private water sources, outlets and reservoirs

Projects

Video Upsampling of CCTV Footages | *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)