SANKALPA RIJAL

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EDUCATION

Villanova University Aug 2024 – May 2026
Master of Science in Computer Science
Algorithm Design & Analysis, Machine Learning, Database Systems, Computation Theory

Tribhuvan University Nov 2018 – Apr 2023
Bachelor's Degree in Computer Engineering
OOP, DSA, Organization Management, Big Data, Data-mining

PROFESSIONAL EXPERIENCES

Graduate Assistant Aug 2024 – present
Graduate Assistant & Research Support *College of Liberal Arts and Sciences, Villanova University*

- Assisting Dr. Mauricio Gouvea Gruppi in semantic evaluation research, analyzing long textual data to extract contextual insights.
- Utilizing traditional machine learning tools and state-of-the-art LLMs to study grammatical structures, entity positioning, and their impact on sentiment analysis.
- Teaching Assistant for CSC 1300: Discrete Structures grading, and weekly student engagement.

Asst. Instructor 2023
Workshop on Machine Learning and Deep Learning *IOE, Thapathali Campus*

- Ran a 10-day long workshop class on basic to application level machine learning and deep learning.

PROJECTS

- **Image Captioning with Vision-Text Models.**
  Developed a Vision-Text model for automatic image captioning using Vision Transformer (ViT) encoder and GPT-2 decoder, achieving optimized performance through comparative analysis of frozen vs fine-tuned encoder architectures.
  Implemented end-to-end deep learning pipeline using PyTorch and Hugging Face Transformers, incorporating ROUGE metrics for model evaluation and automated caption generation for new images.
- **Brain Tumor Classification System with Deep Learning.**
  Developed a comprehensive MRI scan analysis system to detect and classify brain tumors using deep learning models.
  Implemented VGG16 and InceptionV3 architectures achieving classification of brain tumors into 4 distinct categories.
  Enhanced model robustness through data augmentation techniques including rotation, shifts, zoom and flips.
  Integrated class activation mapping (CAM) for model interpretability by generating heatmaps of tumor regions.
  Built end-to-end ML pipeline with data preprocessing, model training, evaluation and visualization components.
- **Monaural Multi-speaker Speech Separation. [Major Project]**
  Researched and developed a Transformer encoder-based model for separating multiple speakers from a single-channel audio signal.
  Designed a model based on the novel ***Perceiver*** architecture, leveraging latent-space representation to improve efficiency.
  Optimized transformer-based speech separation by reducing computational complexity while maintaining high accuracy.
  Conducted extensive experimentation, evaluating separation quality, and computational performance against existing models.

- **Handwritten Devanagari Character Recognition Using Deep Neural Networks.** [**Minor Project**]
  Collected and curated a custom dataset of handwritten Devanagari characters from multiple individuals.
  Developed a deep learning model using Convolutional Neural Networks (CNN) for accurate character recognition.
  Preprocessed and augmented the dataset to improve model generalization and robustness.
  Evaluated model performance using metrics such as accuracy and loss, optimizing hyperparameters for better results.
- **Fitness Flow.**
  Developed a cross-platform web application for tracking users' daily routines and habits to promote consistency.
  Designed an intuitive UI/UX for easy habit tracking and progress visualization.
  Implemented customizable goal-setting and reminders to help users stay on track.

PUBLICATION(S)

S. Rijal, R. Neupane, S. P. Mainali, S. K. Regmi, and S. Maharjan, "Monaural Multi-Speaker Speech Separation Using Efficient Transformer Model," In Proc. International Conference on Technologies for Computer, Electrical, Electronics & Communication, 2023, pp. 41-45.

SKILLS

Technical Skills	AI/ML,Data-mining — Python, PyTorch, Matlab, C++, React, MySQL, Git, GitHub
Soft Skills	Adaptability, Time Management, Communication, Flexibility

CERTIFICATIONS AND COURSES

- **Machine Learning Specialization**, **Machine Learning**, **Build Basic GANs**, **Sequence Models**, **Game Theory.**

ACHIEVEMENTS AND AWARDS

- **Thapathali Scholarship** recipient for 7 consecutive semesters for academic performance