

# ARPAN POUDEL

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## OBJECTIVE

Aspiring Computer Science professional specializing in machine learning, signal processing, and computer vision. Proficient in applied computing with a strong foundation in developing innovative solutions for complex problems. Seeking opportunities to leverage my skills in a dynamic and challenging environment.

## EDUCATION

**Master of Science (M.S.) - Computer Science** Dec 2024 (Expected)  
University of Arkansas, Fayetteville, AR 4.0 GPA

**Bachelor of Engineering (B.E.) - Computer Engineering** Dec 2018  
Tribhuvan University, Kathmandu, Nepal 74 %

## SKILLS

**Language:** Python, MATLAB, Java, C++

**Libraries:** PyTorch, TensorFlow, NumPy, Scikit-learn, Pandas, Open-CV, Flask, Seaborn

**Machine learning:** Feature Engineering, Optimization, Data Analysis, Modeling, EDA, advanced analytics, analytics, image processing, generative artificial intelligence (Gen AI), Deep Learning

**Databases:** SQL, MongoDB, PySpark

**Tools:** Git, Excel, VS Code, Jupyter Notebook, Docker, Microsoft Office

**Soft Skills:** Innovative, Problem-Solving, Communication, Team Collaboration, Willingness to learn, Creativity

## EXPERIENCE

**University of Arkansas, Fayetteville, AR: Research and Teaching Assistant** Jan 2022 - Present

- Conducted research to enhance the resolution of MRI images for studying brain microstructure in Alzheimer's patients, utilizing computer vision and advanced image processing techniques.
- Led a project in lensless imaging, solving complex inverse problems with deep learning model in PyTorch, achieving a 1.35x increase in image reconstruction accuracy.
- Engineered a lensless camera prototype using Raspberry Pi to handle the limitations of current imaging system.
- Executed comprehensive data cleaning and preprocessing on over 500 patient records using Pandas; created a model pipeline to classify patient mortality risk from Type 2 Myocardial Infarction with 85% accuracy.
- Assisted in teaching 3 undergraduate courses (Algorithms, Data Structures), incorporating hands-on coding in Python, Java, and C++.

**Government of Nepal, Jhapa, Nepal: IT Engineer** Nov 2019 - Dec 2021

- Lead and managed team of six members to develop Intranet architecture, perform technical assessment of the government's infrastructures, and write reports of implementation and assessments establishing a foundation for e-governance with a budget of \$400,00 cutting down paperwork by 50%.
- Provided training and knowledge transfer sessions to government officials for e-governance.
- Resolved server issues and provided root cause analysis report (RCA) for system problems

## PROJECTS

**Unsupervised Magnetic Resonance Imaging Super-resolution** Jan 2024 - Present

Proposed and developed a novel unsupervised deep learning network for Magnetic Resonance Imaging (MRI) capable of generating high-resolution images from low-resolution images which is 5 times faster than current state-of-the-art methods.

- Trained generative model to learn the distribution of medical images to sample high-resolution MRI images reducing the MRI scan time by 30% in multi-node multi-GPUs.
- Prepared and preprocessed a medical dataset to train a custom generative model.
- Proposed a novel sampling algorithm to enforce data consistency using Fourier Transform.

## **Solving inverse problems in lensless image reconstruction with generative models**

Aug 2023 - Jan 2024

Created a novel sampling algorithm for controllable image generation for lensless cameras.

- Trained score-based generative model to learn the distribution of natural images as a prior achieved 1.2 times increase in image reconstruction accuracy.
- Implemented an unrolling of the Alternating Direction Method of Multipliers (ADMM) for data consistency.
- Implemented an attention based U-Net to denoise the initial measurement obtained from the lensless camera.

## **Object Tracking and Image Segmentation on low-powered devices**

Jan 2024 - Present

Successfully implemented an image segmentation algorithm on FPGA to accurately trace chicken movements.

- Developed and implemented a segmentation model using PyTorch to identify and track chickens in video feeds for real-time processing.
- Engineered a simplified U-Net architecture for efficient segmentation, specifically optimized for FPGA deployment using Verilog.
- Analyzed and compared performance metrics, demonstrating significant speed enhancements when utilizing FPGA over traditional GPU setups.
- Translated PyTorch model code into FPGA-compatible Verilog code employing the Xilinx Deep Learning Processor Unit (DPU) with Vitis-AI for optimized inference.

## **Semantic Question Matching for Q&A Forums**

Jan 2018 - Jan 2019

Addressed the problem of question duplication in Q&A forums like Quora

- Preprocessed a dataset of over 400,000 question pairs using tokenization, lemmatization, and removal of stop words for feature extraction.
- Designed an artificial neural network to fit the extracted features, achieving an accuracy of 86.09% in detecting duplicate questions.

## **PUBLICATIONS**

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- A. Poudel, U. Nakarmi, Nian Wang, "Fast Sampling for MRI Super-resolution Using Score-Based Diffusion Models," (Draft).
- A. Poudel, U. Nakarmi, "DeepLIR: Attention-based approach for Mask-Based Lensless Image Reconstruction," in Proc. of IEEE/CVF WACV, 2024.
- E. Kabir, A. Poudel, Z. Aklah, M. Huang, D. Andrews, "A Runtime Programmable Accelerator for Convolutional and Multilayer Perceptron Neural Networks on FPGA," in Applied Reconfigurable Computing 2022.
- A. Dhakal, A. Poudel, S. Pandey, S. Gaire, H. P. Baral, "Exploring Deep Learning in Semantic Question Matching," in ICCCS, IEEE, 2018.

## **VOLUNTEER**

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- Review of submitted papers in the field of machine learning for conference Southwest Symposium on Image Analysis and Interpretation (SSIAI), 2024.
- Led and managed the Nepalese Student Organization at the University of Arkansas.

## **AWARDS**

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- Won first prize of \$2,500 in the Healthcare Innovation Sprint 2024, organized by the Conductor, Arkansas.
- Reginald R. "Barney" & Jameson A. Baxter Graduate Fellowship 2023.
- First Runner-Up in Genese CodeCamp 2018 Coding Competition.