






# Manish Dhakal

Computer Vision . Large Language Models

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## Research

Applied Deep Learning Researcher working at the intersection of *Computer Vision, LLMs, and Model Compression* (Knowledge Distillation, PEFT). Expertise in *Multimodal*, *3D Point Cloud*, and *Medical Imaging* data for robust, resource-efficient systems.

## Education

### M.S. in Computer Science

Georgia State University

August 2024 – May 2026

Supervisor: [Yi Ding, Ph.D.](#)

- Deep learning projects on *2D/3D computer vision and large language models (LLMs)*, funded by the US Department of Defense (DoD).
- Research in *efficient machine learning & model compression*.
- Grade: 4.0/4.0

### Bachelor in Computer Engineering

Pulchowk Campus, Institute of Engineering, Tribhuvan University

Undergraduate School

November 2017 – April 2022

Thesis Supervisor: [Prof. Subarna Shakya](#)

- *Ranked 11<sup>th</sup> (top 0.1%)* in the engineering entrance exam, competing with *15,000+ candidates*, received *full scholarship* for undergraduate studies.
- Gained knowledge about *significant CS courses* like AI, Image Processing, Data Structure & Algorithm, DBMS, Software Engineering, and so on.
- *Thesis*: Automatic speech recognition for *low-resourced Nepali language* which was later presented at an IEEE conference.

## Ongoing Projects

### Knowledge Distillation

LLMs

- Developing a robust knowledge distillation method utilizing a *teacher-student paradigm* to transfer complex knowledge efficiently.
- Engineering a feature-transfer mechanism between the teacher and student models' intermediate layers to capture and leverage rich, internal representations, ensuring robustness and high fidelity in model compression and knowledge transfer.

### LLM-Guided Adaptation for Vision-Language Models

LLMs, VLMs

- *Substituting visual prompts* with textual descriptions to enable pure LLMs to handle vision-language tasks, thereby mitigating the need for standard Vision-Language Models (VLMs).
- LLM-centric VLM adaptation method where the LLM itself provides preference feedback to optimize the textual descriptions.

### Parameter Efficient Fine-Tuning

Point Cloud

- *Graph Features Tuning (GFT)*, a Parameter-Efficient Fine-Tuning (PEFT) method specifically for point cloud data, reducing computational and memory costs compared to earlier approaches.
- Achieved competitive performance on object classification and segmentation tasks while substantially *reducing the number of trainable parameters* by integrating graph features into deeper layers via skip connections and efficient cross-attention.

### 2022-Present

*Scholar* Citations: 70+ & h-index: 4

- [Preprint] Budathoki, A., & [Dhakal, M.](#) (2025). [Adversarial Robustness Analysis of Vision-Language Models in Medical Image Segmentation](#). arXiv preprint arXiv:2505.02971. [\[Code\]](#)
- Adhikari, R., Thapaliya, S., [Dhakal, M.](#), & Khanal, B. (2024). [TuneVLseg: Prompt Tuning Benchmark for Vision-Language Segmentation Models](#). In Proceedings of the Asian Conference on Computer Vision (pp. 126-144). [\[Code\]](#)
- [Dhakal, M.](#), Adhikari, R., Thapaliya, S., & Khanal, B. (2024). [Finetuning Vision-Language Segmentation Efficiently with Lightweight Blocks](#). In International Conference on Medical Image Computing and Computer-Assisted Intervention (pp. 712-722). Cham: Springer Nature Switzerland. [\[Code\]](#)
- Adhikari, R.\*, [Dhakal, M.\\*](#), Thapaliya, S.\*, Poudel, K., Bhandari, P., & Khanal, B. (2023, October). [Synthetic Boost: Leveraging Synthetic Data for Enhanced Vision-Language Segmentation in Echocardiography](#). In *International Workshop on Advances in Simplifying Medical Ultrasound* (pp. 89-99). Cham: Springer Nature Switzerland. [\[Code\]](#)
- Poudel, K.\*, [Dhakal, M.\\*](#), Bhandari, P.\*, Adhikari, R.\*, Thapaliya, S.\*, & Khanal, B. (2023). [Exploring Transfer Learning in Medical Image Segmentation using Vision-Language Models](#). In *Medical Imaging with Deep Learning*. PMLR, 2024. [\[Code\]](#)
- [Dhakal, M.](#), Chhetri, A., Gupta, A. K., Lamichhane, P., Pandey, S., & Shakya, S. (2022, July). [Automatic speech recognition for the Nepali language using CNN, bidirectional LSTM and ResNet](#). In *2022 International Conference on Inventive Computation Technologies (ICICT)* (pp. 515-521). IEEE. [\[Code\]](#)

## Work Experience

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### Nepal Applied Mathematics and Informatics Institute for research (NAAMII)

Lalitpur, Nepal

Research Assistant

April 2022 – June 2024

Supervisor: [Bishesh Khanal, Ph.D.](#)

- Developed skills for *object detection and segmentation* tasks on 2D medical images and explored their multi-modal approach ( esp. *vision-language models* ); also worked on segmentation with *3D mesh* data.
- Demonstrated *strong skills in writing scientific manuscripts*, with multiple papers submitted for review, showcasing the ability to *communicate methodologies, results, and implications* effectively.
- Ensured *reproducibility and modularity in ML projects* by implementing robust methodologies and practices, allowing for the transparent and replicable programming of the projects.

## Past Projects

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### Lower Limb Segmentation

July 2023 – September 2023

Medical Imaging

Supervisor: [Taman Upadhaya, Ph.D.](#)

- Conducted *training experiments* of different deep learning models on the remote server to segment three bones – knee, pelvis, and ankle – from CT scans of the lower limbs of patients.
- *Deployed a robust Python rest API* on the remote server for the segmentation request from a client, with a pipeline including pre-processing, inference, and post-processing steps.
- Ensured *interoperability, reproducibility, and understandability* of the deployed application using Docker, and well-structured documentation and comments.

### Vision Language Segmentation Models (VLSMs) for Medical Images

May 2023 – August 2024

Medical Imaging

- Reported zero-shot and finetuned segmentation performance of *4 VLSMs* on *11 medical datasets* using *9 types of prompts* derived from *14 attributes*, prompts are given as text conditioning information.
- Worked with *encoder-decoder architecture* to generate binary segmentation masks for VLSMs.

- Tested the compatibility of the VLSMs (such as *CLIPSeg and CRIS*) pre-trained for open-domain images with medical images.

## Object Detection in 2D Orthopantomogram (OPG) Images

September 2022 – August 2024

### Dental Imaging

- Critically analyzed the *literature and state-of-the-art* models for different segmentation and detection tasks on radiology images of dentistry and their inadequacy.
- Designed and developed the *data annotation tool* for object detection over 2D OPG images.
- Working on identification and localization of dental *anatomical structures and abnormalities* while benchmarking with existing methods like *YOLO, RetinaNet, RCNN, and FastRCNN*.

## Segmentation in 3D Teeth Scan

Summer 2022

### MICCAI Challenge 2022

- Learned about the representation and preprocessing of *3D mesh and point cloud* data.
- Benchmarked with different 3D point cloud segmentation models such as *Pointnet++ and DeltaConv*.

## Nepali AutoComplete and LM

August 2020 – October 2020

### Open Source Project

- Designed and trained *language model of Nepali (ie. Devnagari transcript)* for the text auto-complete system.
- Programmed the *pre-processing pipeline* to remove the non-Nepali characters from the dataset.

## Super-Resolution with GAN (SRGAN)

May 2020 – August 2020

### Open Source Project

- Implemented *open source model* of *SRGAN* with Keras/TensorFlow.
- Developed the *understanding of generator and discriminator* in GAN-based generative models.

## Teaching

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### Community Eye, ENT & Rehabilitation Center (CEERS)

Bhaktapur, Nepal

#### Trainer

June 2023 – June 2024

- *Training a group of interns* to develop medical imaging applications with the use of ML.
- Instructing and guiding them about ML through activities like *paper reading sessions, lecture-lab sessions, and topic presentations*.

### 4th Annual Nepal AI School (ANAIS)

Kathmandu, Nepal

#### Teaching Assistant

May 2023 – June 2023

- *Guided participants* through a series of labs related to *neural networks, transformers, federated learning, graph neural networks, active learning, and so on*.
- *Mentored three groups* during the 10-day *machine learning hackathon* (namely, Hack-a-Dev).

### Software Fellowship, Locus 2021

Online

#### Programming Instructor

Summer 2021

- Provided tutoring on *software development life cycle* and assisted participants with *software documentation and library/framework installation*.
- Taught participants about *API development for web applications*, emphasizing its concepts, best practices, and usage.

## Achievements/Services

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**2025**     *AAAI Reviewer*  
**2024**     *LMIC Travel Grant* by the conference of MICCAI.  
**2024**     *Presidential Fellowship* by the TCV initiative at GSU (Only 6% of the doctoral students).  
**2017**     *Undergraduate* funded by the Government of Nepal.

### Technical skills

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<b>Deep Learning</b>	<i>Unimodal and multimodal learning</i> , large language models (LLMs), model quantization, efficient learning, reinforcement learning fine-tuning, 2D/3D vision, convolution, and transformers.
<b>Writing</b>	<i>Knowledge synthesis</i> from the existing literature, <i>writing scientific documents</i> and <i>manuscripts</i> with <i>LaTeX</i> , and <i>communicating the results</i> to the community with transparency.
<b>Remote Server</b>	Able to work with <i>remote Linux machines</i> for coding and project deployment using <i>SSH, shell script, tmux, Nginx, and Docker</i> .

### References (Research Advisors)

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**Yi Ding, Ph.D.**

Assistant Professor, *Department of Computer Science, Georgia State University*

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**Bishesh Khanal, Ph.D.**

Research Director, *Nepal Applied Mathematics and Informatics Institute for research (NAAMII)*

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**Prof. Subarna Shakya**

Professor of Computer Engineering, *Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University*

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**Taman Upadhaya, Ph.D.**

Associate Researcher, *University of California San Francisco* || Adjunct Research Scientist, *Nepal Applied Mathematics and Informatics Institute for research (NAAMII)*

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