

# BIDUR KHANAL

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🔗 Bidur-Khanal 🌐 bidurkhanal5 🎓 BidurKhanal ResearchGate: Bidur-Khanal

## EDUCATION

**Ph.D. in Imaging Science** *Aug 2020 - Expected Dec 2024*  
*Rochester Institute of Technology* Rochester, NY, USA  
**Research Focus:** Medical Image Analysis using Deep Learning with Limited Labeled Data or Noisy Labels  
**Relevant Courses:** Intro to Medical Imaging; Mathematics for Deep Learning; Image Processing and Computer Vision; Human Visual System; Fourier Methods for Imaging; Probability Noise and System Modeling

**Bachelor's in Electronics and Communication Engineering** *Nov 2013 - Dec 2017*  
*Institute of Engineering, Pulchowk Campus, Tribhuvan University* Lalitpur, Nepal  
**Relevant Courses:** Data Mining; Artificial Intelligence; Big Data Technologies

## TECHNICAL SKILLS

<b>Programming Languages</b>	Python(Proficient), MATLAB (Intermediate), C/C++ (Basics)
<b>Python Packages</b>	Pytorch, Tensorflow, Keras, Matplotlib, Seaborn, Numpy, Scipy, Scikit-Learn, Pandas, OpenCV, Regex, Jupyter
<b>Tools and Frameworks</b>	Git, Bash, Conda, SLURM, AWS, ITK-SNAP, Neptune, Weight & Biases

## RESEARCH EXPERIENCE

**Graduate Research Assistant** *July 2022 - Present*  
*Biomedical Modeling, Visualization and Image-guided Navigation Lab, RIT* Rochester, NY, USA

- Studied how network architecture, pretraining methods, and dataset characteristics affect the medical image classification robustness amidst noisy labels in several settings ( 1<sup>st</sup> paper submitted to EMBC 2024; 2<sup>nd</sup> paper submitting to MedIA journal).
- Improved the robustness of medical image classification against noisy labels by using self-supervised pretraining (published at DEMI Workshop, MICCAI 2023).
- Developed a multimodal active learning method for 2D brain tumor segmentation and chest x-ray classification (accepted at MIUA 2023).
- Investigated the impact of class-dependent label noise in medical image classification on noise-free classes with subtle visual differences (published at SPIE Medical Imaging 2023).

**Graduate Research Assistant** *Jan 2021 - June 2022*  
*Machine and Neuromorphic Perception Lab, RIT* Rochester, NY, USA

- Investigated the impact of heterogeneous label noise on deep learning-based vision tasks in multi-class, multi-task, and multi-label scenarios (published at ISVC 2021).
- Conducted an extensive study of online learning classifiers (streaming LDA, PA classifier, NCM, and AROW) for efficient continual learning.

**Machine Learning Research Assistant** *April 2019 - Aug 2020*  
*NepAl Applied Mathematics and Informatics Institute for Research* Lalitpur, Nepal

- Developed deep learning framework for vertebra detection, spinal curvature estimation, and, scoliosis detection from X-ray images (published at MICCAI 2019 AASCE Challenge).
- Created a colorimetric PAD image dataset for pesticide concentration estimation using smartphone cameras, and benchmarked it with various ML models. (published at ACS Omega 2021).

## INDUSTRY WORK EXPERIENCE

**Deep Learning Engineer** *Dec 2019 - Aug 2020*  
*Zeg, 3D AI solution Company (Worked remotely, part-time consulting job)* London, UK

- Implemented several GAN models for adding realism to computer-rendered images.
- Developed deep learning-based framework for key points detection in 2D images for 3D modeling.

**Firmware/Image Processing Engineer***Nepal Digital Systems (startup company)**Feb 2018 - Aug 2018**Lalitpur, Nepal*

- Interfaced Raspberry Pi, Picamera, and GSM/GPS module with effective network communication for home automation application.
- Built OpenCV-based computer vision pipeline for edge devices to assess material strain under force.

**PUBLICATIONS**

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- **Bidur Khanal**, Prashant Shrestha, Sanskar Amgain, Bishesh Khanal, Binod Bhattarai, and Cristian A Linte. Investigating the robustness of vision transformers against label noise in medical image classification. *Accepted at EMBC*, 2024
- **Bidur Khanal**, Binod Bhattarai, Bishesh Khanal, and Cristian Linte. How does self-supervised pretraining improve robustness against noisy labels across various medical image classification datasets? *Preprint*, 2024
- Prashant Shrestha, Sanskar Amgain, **Bidur Khanal**, Cristian A. Linte, and Binod Bhattarai. Medical vision language pretraining: A survey. *Preprint*, 2024
- **Bidur Khanal**, Binod Bhattarai, Bishesh Khanal, and Cristian A Linte. Improving medical image classification in noisy labels using only self-supervised pretraining. In *MICCAI Workshop on Data Engineering in Medical Imaging*, pages 78–90. Springer, 2023
- **Bidur Khanal**, Binod Bhattarai, Bishesh Khanal, Danail Stoyanov, and Cristian A Linte. M-vaal: Multimodal variational adversarial active learning for downstream medical image analysis tasks. *Accepted at MIUA 2023*
- **Bidur Khanal**, SM Kamrul Hasan, Bishesh Khanal, and Cristian A Linte. Investigating the impact of class-dependent label noise in medical image classification. In *SPIE Medical Imaging 2023: Image Processing*
- Sunan Sapkota, **Bidur Khanal**, Binod Bhattarai, Bishesh Khanal, and Tae-Kyun Kim. Label geometry aware discriminator for conditional generative networks. *ICPR*, 2022
- **Bidur Khanal**, Pravin Pokhrel, Bishesh Khanal, and Basant Giri. Machine-learning-assisted analysis of colorimetric assays on paper analytical devices. *ACS omega*, 2021
- **Bidur Khanal** and Christopher Kanan. How does heterogeneous label noise impact generalization in neural nets? In *International Symposium on Visual Computing*. Springer, 2021
- Liansheng Wang, Cong Xie, Yi Lin, Hong-Yu Zhou, **Bidur Khanal**, Bishesh Khanal, et al. Evaluation and comparison of accurate automated spinal curvature estimation algorithms with spinal anterior-posterior x-ray images: The AASCE 2019 challenge. *Medical Image Analysis*, 2021
- **Bidur Khanal**, Lavsén Dahal, Prashant Adhikari, and Bishesh Khanal. Automatic cobb angle detection using vertebra detector and vertebra corners regression. In *International Workshop and Challenge on Computational Methods and Clinical Applications for Spine Imaging*. Springer, 2019

**GROWTH, ACHIEVEMENTS AND HONORS**

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**Tiger Tales Toastmasters, RIT**

• Presentation Mastery pathway (level 2)

*Aug 2022 - Present*

• Sergeant at Arms Role: Responsible for managing logistics at Toastmasters meetings.

*May 2023 - Present***RIT PhD. Merit Scholarship/Assistantship***Aug 2020 - Present***AWARE-AI NSF Research Trainee, RIT***Jan 2022 - May 2022***First Treasurer of Nepal Student Association, RIT***April 2020 – April 2021***Merit-Based Scholarship for Children of Government Employees***2018*

Provided by: Government of Nepal, Ministry of General Administration (MoGA)

**Merit-Based Partial Tuition Waiver, Tribhuvan University***Nov 2013 - Dec 2017***Appearance in National Television as an Idea Presenter***2017*

Received the best idea award under Energy and Sustainability Category