

# BIDUR KHANAL

Ph.D. student in Imaging Science

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[Personal Website](#), [Google Scholar](#), [ResearchGate](#), [GitHub](#), [LinkedIn](#)

**RESEARCH INTERESTS:** Deep learning, computer vision, deep learning applications in medical imaging

## EDUCATION

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**Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology** **Aug 2020 - Present**

*PhD. student in Imaging Science*

**Advisor:** Dr. Cristian A. Linte, Lab: BiMVisIGN

**Research:** Medical Image Analysis using Deep learning from Data with Limited Labels or Noisy Labels

**Courses:** Mathematics for Deep Learning, Deep Learning for Computer Vision, Image Processing and Computer Vision, Human Visual System, Fourier Methods for Imaging, Radiometry, Optics for Imaging, Probability Noise and System Modeling

GPA: 3.96/4

**Institute of Engineering, Pulchowk, Tribhuvan University, Nepal**

**Nov 2013 - Dec 2017**

*Bachelor of Electronics and Communication Engineering*

**First Nepal Winter School in AI**

**Dec 20 - 30, 2018**

**Second Nepal Winter School in AI**

**Dec 10 - 20, 2019**

*Received Full Scholarship*

**Topics covered:** Linear Algebra, Probability and Statistics, Computer Vision, Deep Learning, Natural Language Processing, VAEs and GANs

## PUBLICATIONS

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**Bidur Khanal**, and Christopher Kanan. "How Does Heterogeneous Label Noise Impact Generalization in Neural Nets?." In International Symposium on Visual Computing, pp. 229-241. Springer, Cham, 2021.

Suman Sapkota\*, **Bidur Khanal**\*, Binod Bhattarai, Bishesh Khanal, and Tae-Kyun Kim. "Label Geometry Aware Discriminator for Conditional Generative Networks." Accepted in ICPR (2022) [\* denotes equal contribution]

**Bidur Khanal**, Pravin Pokhrel, Bishesh Khanal, and Basant Giri. "Machine-Learning-Assisted Analysis of Colorimetric Assays on Paper Analytical Devices." ACS omega 6, no. 49 (2021): 33837-33845.

Liansheng Wang, Cong Xie, Yi Lin, Hong-Yu Zhou, Kailin Chen, Dalong Cheng, Florian Dubost, Benjamin Collery, **Bidur Khanal** et al. "Evaluation and comparison of accurate automated spinal curvature estimation algorithms with spinal anterior-posterior X-Ray images: The AASCE2019 challenge." Medical Image Analysis 72 (2021): 102115.

**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, pp. 81-87. Springer, Cham, 2019.

## RELATED WORK EXPERIENCE

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**Research Assistant****July, 2021 – Present***BiMVisIGN, Rochester Institute of Technology*Advisor: [Dr. Cristian A. Linte](#)

- **Medical Image Analysis using Deep learning from Data with Limited Label or Noisy Labels**
  - Investigating how the label noise impacts medical image dataset under various settings in deep learning.
  - Working on developing active deep learning method for semantic segmentation that ranks the incorrect samples, in a dataset, for label correction based on their importance in learning.

**Research Assistant****May, 2021 – June, 2022***KLab, Rochester Institute of Technology*Advisor: [Dr. Christopher Kanan](#)

- **Investigate the Impact of Heterogeneous Label Noise in Neural Nets**
  - Accessed the impact of class-dependent, task-dependent, and label-dependent heterogeneous noisy labels on multi-class classification, multi-task learning, and multi-label learning settings respectively, in vision tasks.
  - Hypothesized and validated that heterogeneous label noise would only affect the classes that had label noise unless there was transfer from those classes to the classes without label noise.
- **Efficient Online Continual Learning**

Worked on developing efficient online learning classifier that is capable of learning from single pass through the dataset while being computationally efficient.

**Research Assistant****April, 2019 – Aug, 2020***NepAI Applied Mathematics and Informatics Institute for Research (NAAMII),*Advisors: [Dr. Bishesh Khanal](#) and [Dr. Binod Bhattarai](#)

- **Conditional GAN with Additive Angular Margin Loss in Discriminator** (with Dr. Binod Bhattarai)
  - Worked on a novel architecture of class-based conditional GAN by introducing Additive Margin Loss in Discriminator's Class head.
- **Spine Curvature Estimation from X-ray Images** (with Dr. Bishesh Khanal)
  - Worked on deep learning methods for Accurate Vertebra Detection, Spinal Curvature Estimation and Cobb Angle Calculation in X-ray images. Presented its paper at MICCAI 2019 AASCE Challenge
  - Improved the Vertebra Detection Using Object Detection task specific augmentation and ensemble based post processing.
- **Estimating Pesticide Concentration with Smartphone** (*Collaboration: Analytical Chemistry & Machine Learning, with Dr. Bishesh Khanal & [Dr. Basant Giri](#)*)
  - Prepared a new Image dataset for Food Dye and Pesticide assays to study the smartphone based colorimetric detection using data-driven machine learning approach.
  - Accessed machine learning models (SVM, Logistic Regression, Random Forest and ANN) in classifying pesticide concentration labels based on its residue color strength.

**Machine Learning Engineer (Part Time, Remotework)****Dec 1, 2019- Aug 2020**[Zeq.ai](#), United Kingdom, 3D AI solution Company, with Dr. Binod Bhattarai

- Working on Introducing Realism in Computer Rendered Image (Domain Adaptation Problem).

- Implementing Conditional Shape Preserving GANs to Translate Computer Rendered Image to Natural Image.

## Teaching Assistant

Dec 10 – 20, 2019

*Second Nepal Winter School in AI, organized by NAAMII*

- Prepared Lab assignments of Pytorch Tutorial on Deep Learning (with [Dr. Danda Pani Paudel](#))  
Supervised Lab activities: Teaching and assigning lab works in python to beginner students.

## Firmware / Image Processing Engineer

Feb 2018 – Sept 2018

*Nepal Digital Systems, Kathmandu, Nepal (Startup Company)*

- **Motion detection and tracking enabled camera surveillance system**  
Wrote source code to interface Raspberry Pi with picamera and gsm/gps module, developed algorithms for robust motion detection, implemented TCP/IP server/client model on Raspberry Pi.
- **Crack Detection and Elongation measurement in material under strain**  
Implemented image pre-processing techniques, homography and affine transformation, and OpenCV camera calibration. Wrote codes to implement Digital Image Correlation in Raspberry Pi.

## SKILLS

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- **Programming Language:** Python (Proficient), C/C++ (Basics), MATLAB (Basics),
- **Frameworks and Tools:** OpenCV, Git, PyTorch, Tensorflow (Basics), Pandas, NumPy, SciPy, Matplotlib, Scikit-learn, AWS, LaTeX

## HONOURS/ACHIEVEMENTS/LEADERSHIP

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- **AWARE-AI NSF Research Trainee**, Jan 2022- Present
- **Treasurer of Nepal Student Association**, Rochester Institute of Technology, April 2020 – April 2021
- **Received Merit-Based Scholarship** for Children of Government Employees , Category: Engineering  
Provided by: Government of Nepal, Ministry of General Administration (MoGA)
- **Awarded Sujan Tuladhar Memorial Science Fair Award – 2010, Gold Medal** for best science project of the year
- **Received** Merit-Based Partial Tuition Waiver, *Institute of Engineering, T.U*, Duration: 4 Years
- Appearance in National Television as an Idea Presenter; **received** the best idea award under Energy and Sustainability Category
- **Achieved** first award in *Global Game Jam Nepal*, 2016; Developed an android game application “Bull Chase” (Team Work)
- **1<sup>st</sup> Runner Up** in Tech Bihani 2016, software competition organized at *Advanced College of Engineering* ; Contribution: Backend programming for database management using SQL and PHP

## HOBBIES/ INTERESTS

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Playing Football, Trekking, Playing Guitar, Singing