BIDUR KHANAL

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Bidur-Khanal bidurkhanal5 BidurKhanal ResearchGate: Bidur-Khanal

Research Interests: Deep learning, computer vision, medical image analysis, multi-modal active learning, continual learning, learning with noisy labels

EDUCATION

Ph.D. in Imaging Science *Aug 2020 - Present*
Rochester Institute of Technology *Rochester, NY, USA*
Advisor: Prof. Cristian A. Linte
Research Topic: *Medical Image Analysis using Deep learning from Data with Limited Label 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, Probability Noise and System Modeling

Winter School in AI *Dec 20 - 30, 2018*
NepAl Applied Mathematics and Informatics Institute for Research (NAAMII) *Dec 10 - 20, 2019*
Short Courses: Linear Algebra, Probability and Statistics, Natural Language Processing, VAEs and GANs

Bachelor's in Electronics and Communication Engineering *Nov 2013 - Dec 2017*
Institute of Engineering, Pulchowk Campus, Tribhuvan University *Lalitpur, Nepal*

PUBLICATION

- Suman Sapkota*, **Bidur Khanal**, Binod Bhattarai, Bishesh Khanal, and Tae-Kyun Kim. Label geometry aware discriminator for conditional generative networks. *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(49):33837–33845, 2021
- **Bidur Khanal** and Christopher Kanan. How does heterogeneous label noise impact generalization in neural nets? In *International Symposium on Visual Computing*, pages 229–241. 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 aasce2019 challenge. *Medical Image Analysis*, 72:102115, 2021
- **Bidur Khanal**, Lavsen 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*, pages 81–87. Springer, 2019

TECHNICAL SKILLS

Programming Languages	Python(Proficient), C/C++, MATLAB
Python Packages	Pytorch, Tensorflow, Matplotlib, Seaborn, Numpy, Scipy, Scikit-Learn, Pandas, OpenCV, Regex, Jupyter
Tools and Frameworks	Git, Bash, Conda, Slumr, AWS, LaTeX, Raspberry-Pi

RESEARCH EXPERIENCE

Biomedical Modeling, Visualization and Image-guided Navigation Lab *July, 2021 - Present*
Research Assistant *Rochester, NY*

· Investigated how the label noise impacts deep learning based classification in medical image dataset under various settings, developing methods to reduce the ifluence of noisy labels.
· Working on developing multi-modal deep active method for semantic segmentation of medical 2D images that ranks the incorrect samples, in a dataset, for label correction based on their importance in learning.

Machine and Neuromorphic Perception Laboratory *May, 2021 - June 2022*
Research Assistant *Rochester, NY*

· 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.

· Worked on developing efficient online learning classifier using a proposed large-margin regularized discriminant analysis that is capable of learning from single pass through the dataset while being computationally efficient.

WORK EXPERIENCE

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

· Worked on adding realism in computer rendered images: built and fine-tuned GAN models for conditional image domain translation.
· Worked on 2D image to 3D model pipeline: developed deep learning based algorithm for detecting keypoints in 2D images for 3D modeling.

Research Assistant *April 2019 - Aug 2020*
NepAl Applied Mathematics and Informatics Institute for Research (NAAMII) *Kathmandu, Nepal*

· Spine Curvature Estimation from X-ray Images: Developed deep learning framework for automatic vertebra detection, spinal curvature estimation and cobb angle calculation to detect scoliosis from X-ray images. Work presented at MICCAI 2019 AASCE Challenge.
· Estimating Pesticide Concentration with Smartphone: Created a new dataset for estimating food dye and pesticide concentration from smartphone images of assays, using machine learning framework. Designed image pre-processing pipeline and accessed/analyzed ML models (SVM, Logistic Regression, Random Forest and neural nets) in classifying concentration labels. Work is published in ACS omega journal.

Teaching Assistant *Dec 10-20 2019*
Second Nepal Winter School in AI, organized by NAAMII *Pokhara, Nepal*

· Prepared lab assignments on deep learning basics using pytorch, supervised and taught beginner students during the lab.

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

· Motion detection enabled security 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 for home automation application.
· Crack detection and elongation measurement in material under strain: Developed an efficient algorithm for Raspberry-Pi using OpenCV to estimate strength of a specimen using from images of specimen under strain.

ACHIEVEMENTS AND HONORS

RIT PhD. Merit Scholarship/ Assistantship *Aug 2020 - Present*

AWARE-AI NSF Research Trainee, Rochester Institute of Technology *Jan 22, 2022 - Present*

Treasurer of Nepal Student Association, Rochester Institute of Technology *April 2020 – April 2021*

Merit-Based Scholarship for Children of Government Employees,
Provided by: Government of Nepal, Ministry of General Administration (MoGA) *2018*

Sujan Tuladhar Memorial Science Fair Award, Gold Medal for best science project of the year *2010*

Merit-Based Partial Tuition Waiver, Tribhuvan University *Nov 2013 - Dec 2017*

Appearance in National Television as an Idea Presenter,
Received the best idea award under Energy and Sustainability Category *2017*