SANDESH GHIMIRE

✉ sg9872@rit.edu ● 🌐 www.sandeshgh.com
Google Scholar, ResearchGate, LinkedIn

Research Interest

Machine Learning, Deep Learning, Statistical Inference, Generalization in Deep Learning, Medical Imaging, Medical Signal Processing, Inverse Problems, Cardiac Electrophysiological Analysis

Education

PhD in Computing and Information Sciences   Aug 2015 - Aug 2020
  Rochester Institute of Technology, NY   *GPA: 3.9/4*
  Advisor: Prof. Linwei Wang, Lab: Computational Biomedicine Lab

B.E. in Electronics and Communication Engineering   Oct 2008 - Dec 2012
  Institute of Engineering, Tribhuvan University, Kathmandu, Nepal.   *Grade: 85.1%*
  Specialization: Image Processing and Pattern Recognition   **Ranked 1/346 in IOE**

Work Experience

Postdoctoral Research Associate   Sept 2020 - Present
Supervisor: Profs. Octavia Camps, Jennifer Dy, Dana H. Brooks
Department of Electrical and Computer Engineering, Northeastern University
  o Working at the intersection of machine learning, computer vision and medical images

Graduate Research Assistant   Aug 2015 - Aug 2020
Supervisor: Prof. Linwei Wang
Computational Biomedicine Lab, RIT
  o Worked on machine learning and statistical inference with applications to medical images

Graduate Research Intern   Jul 2019 - Sept 2019
Supervisor: Dr. Mehdi Moradi
Medical Sieve Radiology Group, IBM Research, San Jose
  o On improving generalization of convolutional neural networks while classifying medical images from new source

Electronics/Electrical Engineer   Mar 2014 - June 2015
Nepal Electricity Authority, Central Office, Kathmandu

Research Themes

Generalization and Learning Theory
Supervised by Prof. Linwei Wang
  o Tried to understand and improve different aspects of generalization of deep neural network using learning theories and functional analysis.

Deep Generative Modeling and Inference
Supervised by Prof. Linwei Wang
  o Worked on generative modeling of spatio-temporal cardiac signals using variational autoencoder and combined statistical inference with deep representation learning.

Probabilistic Graphical Models and Inference
Supervised by Prof. Linwei Wang
  o Integrated multiple sources of knowledge and data using PGM framework and proposed several inference strategies to solve the inverse problem.

Regularization and Semi-supervised Learning

Mentored and collaborated with Prashnna Kumar Gyawali with the supervision of Prof. Wang
- Worked on improving semi supervised learning using different smoothness constraints

Data Augmentation and Transfer Learning

Mentored and collaborated with Nilesh Kumar with the supervision of Prof. Wang
- Worked on learning transformation patterns from data and applying them for the purpose of data augmentation and transfer learning

Uncertainty in Deep Learning

Mentored and collaborated with Pradeep Bajracharya with the supervision of Prof. Wang
- Worked on quantifying uncertainty of deep networks, especially in the context of medical image analysis

Geometric Deep Learning

Mentored and collaborated with Xiajun Jiang with the supervision of Prof. Wang
- Incorporated geometric information during inference using graph neural networks to improve generalization while solving inverse problem.

Research Publications

ICDM 2020	Gyawali, P.K., **Ghimire, S.** and Wang, L., 2020. *Enhancing Mixup-based Semi-Supervised Learning with Explicit Lipschitz Regularization*
MICCAI 2020	Jiang, X., **Ghimire, S.**, Dhamala, J., Li, Z., Gyawali, P.K. and Wang, L., 2019, October. *Learning Geometry-Dependent and Physics-Based Inverse Image Reconstruction.*
MICCAI 2020	Gyawali, P.K., **Ghimire, S.**, Bajracharya, P., and Wang, L., 2019, October. *Semi-supervised Medical Image Classification with Global Latent Mixing.*
MICCAI Workshop MLMI	**Ghimire, S.**, Kashyap, S., Wu, J. T., Karargyris, A., Moradi, M.,2020. *Learning Invariant Feature Representation to Improve Generalization across Chest X-ray Datasets*
TMI 2019	**Ghimire, S.**, Sapp, J.L., Horáček, B.M. and Wang, L., 2019. *Noninvasive Reconstruction of Transmural Transmembrane Potential With Simultaneous Estimation of Prior Model Error.*
IPMI 2019	**Ghimire, S.**, Gyawali, P.K., Dhamala, J., Sapp, J.L., Horacek, M. and Wang, L., 2019, June. *Improving generalization of deep networks for inverse reconstruction of image sequences.* (Oral-10% acceptance)
MICCAI 2019	Gyawali, P.K., Li, Z., **Ghimire, S.** and Wang, L., 2019. *Semi-supervised Learning by Disentangling and Self-ensembling over Stochastic Latent Space.*
MICCAI 2019	Dhamala, J., **Ghimire, S.**, Sapp, J.L., Horáček, B.M. and Wang, L., 2019, October. *Bayesian Optimization on Large Graphs via a Graph Convolutional Generative Model: Application in Cardiac Model Personalization.*
ICDM 2019	Gyawali, P.K., Li, Z., Knight, C., **Ghimire, S.**, Horacek, B.M., Sapp, J. and Wang, L., 2019. *Improving Disentangled Representation Learning with the Beta Bernoulli Process.* (Oral presentation)
MICCAI 2018	Dhamala, J., **Ghimire, S.**, Sapp, J.L., Horáček, B.M. and Wang, L., 2018, October. *High Dimensional Bayesian Optimization of Personalized Cardiac Model Parameters via an Embedded Generative Model.* (Oral-4% acceptance)
MICCAI 2018	**Ghimire, S.**, Dhamala, J., Gyawali, P.K., Sapp, J.L., Horacek, M. and Wang, L., 2018, September.*Generative modeling and inverse imaging of cardiac transmembrane potential.*
MICCAI 2017	**Ghimire, S.**, Sapp, J.L., Horacek, M. and Wang, L., 2017, September. *A variational approach to sparse model error estimation in cardiac electrophysiological imaging.*
CinC 2017	**Ghimire, S.** and Wang, L., 2017, September. *L0 norm based sparse regularization for non-invasive infarct detection using ECG signal.* (Oral Presentation)

CinC 2017	**Ghimire, S.**,..., Wang, L., 2017, September. *Overcoming barriers to quantification and comparison of electrocardiographic imaging methods: A community-based approach.* (Oral Presentation)
NeurIPS Workshop	**Ghimire, S.**, Dhamala, J., Gyawali, P.K., Sapp, J.L., Horacek, M. and Wang, L., 2018, September. *Generative modeling and inverse imaging of cardiac transmembrane potential.* (Spotlight talk - 6% acceptance)
Under Review	**Ghimire, S.**, Gyawali, P.K. and Wang, L., 2020. *Reliable Estimation of Kullback-Leibler Divergence by Controlling Discriminator Complexity in the Reproducing Kernel Hilbert Space.*

Presentations

2019	Improving generalization of deep networks for inverse reconstruction of image sequences [**Talk**] The 26th International Conference on Information Processing in Medical Imaging (IPMI). (50th Anniversary) 2019. Hong Kong. [**Talk**] IBM Research, Almaden, San Jose. 2019. [**Poster**] AI@GCCIS Symposium. 2018. RIT [**Poster**] Computing Weekend Research Showcase, 2018, RIT
2018	Generative Modeling and Inverse Imaging of Cardiac Transmembrane Potential [**Poster**] The 21st International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2018. Granada, Spain. [**Spotlight Talk**] NeurIPS Workshop on Machine Learning for Health (ML4H), 2018
2018	Deep Generative Model and Analysis of Cardiac Transmembrane Potentials [**Talk**] The 45th Computing in Cardiology Conference. 2018. Maastricht, Netherlands.
2017	A Variational Approach to Sparse Model Error Estimation in Cardiac Electrophysiological Imaging [**Poster**] The 20th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2017. Quebec City, Quebec, Canada. [**Poster**] GCCIS Research Showcase 2017. RIT [**Poster**] Graduate Research Showcase 2017. RIT
2017	Overcoming Barriers to Quantification and Comparison of Electrocardiographic Imaging Methods: A Community-based Approach. [**Talk**] The 44th Computing in Cardiology Conference. 2017. Rennes, France.
2017	L0 norm based sparse regularization for non-invasive infarct detection using ECG signal [**Talk**] The 44th Computing in Cardiology Conference. 2017. Rennes, France.

Awards and Achievements

IPMI Scholarship for junior scientists - awarded to 10 authors at IPMI 2019 conference.

GCCIS Travel Grant by Golisano College of Computing and Information Sciences to present research work at MICCAI 2017

RIT PhD Merit Scholarship 2015-2020. Financial Support for PhD study at RIT.

Prof. F.N. Trofimenkoff Academic Achievement Award for graduating at the top of class (1/346) in B.E. Electronics and Communication, Institute of Engineering.

The College Fellowship (2008-2012) by Institute of Engineering, Central Campus, Pulchowk based on academic merit and performance.

Undergraduate Scholarship (2008-2012) by Institute of Engineering to support tuition during the undergraduate studies at Central Campus, Pulchowk. Rank: 10/12000 in the entrance exam.

Golden Jubilee Scholarship Award 2008 by Government of India based on academic excellence

Mahatma Gandhi Scholarship Award 2006 by Government of India based on academic excellence

Professional Services

Reviewer

    Conference: MICCAI {2020, 2019, 2018, 2017}, MIDL 2020, Women in Machine Learning 2018

    Journal: Medical Image Analysis, Medical Physics Journal, MBEC Journal

Workgroup Lead

    Lead of the workgroup for CEI Pacing Site Localization Challenge 2017 - 2020. Link

Technical Strengths

    Language/Platforms: Python, PyTorch, Tensorflow, MATLAB, C/C++

    Libraries/Packages: Scikit-learn, SciPy, Pandas, NumPy, GPyTorch, PyTorch Geometric, Matlab CVX

    Tools: LaTeX, ParaView, Docker, Git, Conda, Bash, Latex