

DIPENDRA KUMAR JHA

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Summary: *Ph.D. candidate with 4+ years of research experience in the field of deep learning, machine learning, and artificial intelligence; designing deep neural network and machine learning models for complex scientific datasets using TensorFlow, Caffe, PyTorch, Theano, and Scikit-Learn since last four years.*

EDUCATION

- **Ph.D, Computer Engineering, Northwestern University, USA.** Expected June 2020
Advisor: Prof. Alok Choudhary. *GPA : 3.78/4.0*
- **M.S., Computer Science, Northwestern University, USA.** June 2015
GPA : 3.80/4.0
- **B.E., Computer Science, Tribhuvan University, Nepal.** Dec. 2011
GPA : 87.24/100

PROFESSIONAL EXPERIENCE

- **Graduate Research Assistant, Northwestern University, USA.** June 2013 to Present
 - ◇ **Learning the Chemistry of Materials using AI:** Designed a 17-layered DNN model that automatically captures the chemistry of materials using only elemental compositions, outperformed domain knowledge based ML approach for stability prediction by MAE of 30%. (*Python/Theano/TensorFlow*).
 - ◇ **Optimizing for Minimum Disorientation using CNN:** Built the first deep learning model that predicts the crystal orientations with minimum disorientation from electron diffraction patterns; trained on simulation data and tested on experimental patterns, it outperformed the MAE of state-of-the-art dictionary indexing method by 16% (*Python/TensorFlow*).
 - ◇ **Peak Area Detection Network for 2D X-ray Diffraction Patterns:** Built a CNN model with a peak detection network for directly learning the phase regions from raw 2D X-ray diffraction patterns from experiments containing highly irregular background noise; achieved accuracy of 85% using a training set of 177 XRD patterns with 8 phase region labels (*Python/PyTorch*).
 - ◇ **Deep Regression Residual Networks:** Developed a 48-layered residual DNN model to learn the materials properties from vectors composed of their crystal structures and composition; the DNN model significantly outperformed existing machine learning models on multiple tasks from multiple datasets for prediction modeling without any feature engineering (*Python/TensorFlow*).
 - ◇ **Parallel Deep Neural Networks:** Scaled up the training of the state-of-the-art deep learning models such as Inception and ResNet using a hybrid parallel approach on supercomputers (*C++/Caffe/MPI*).
- **Machine Learning Advisor, Chefling Inc., USA.** June 2017 to Present
 - ◇ Advising the software engineers and data scientists to build AI tools using the state-of-the-art deep learning architectures for real time image recognition (*Python/TensorFlow*).
- **Research Intern, Argonne National Lab, USA.** June 2018 to Aug. 2018
 - ◇ **Neural Architecture Search using Reinforcement Learning:** Built a neural architecture search framework for automation of search for deep neural architectures for scientific datasets using reinforcement learning on supercomputers (*Python/TensorFlow*).
- **Full Time Lecturer, Tribhuvan University, Nepal.** Nov. 2011 - June 2013
 - ◇ Taught courses such as C, C++, Java, Object Oriented Analysis and Design, Theory of Computation and Software Engineering; supervising students on different kinds of undergraduate course and thesis projects in computer science and engineering (*C/C++/Java/MySQL/UML*).
- **Web Developer Intern, Yomari Pvt. Ltd., Nepal.** May 2011 - Sept. 2011
 - ◇ Developed Information and Content Management Systems for educational and medical institutes in Nepal (*Java/JSF/Hibernate/Spring/Ajax/JQuery/JavaScript*).

SELECTED PUBLICATIONS

- **D. Jha**, A. Kusne, R. Al-Bahrani, N. Nguyen, W. Liao, A. Choudhary, C. Wolverton and A. Agrawal. “**Peak Area Detection Network for Directly Learning Phase Regions from Original X-ray Diffraction Patterns**”, *International Joint Conference on Neural Networks*, 2019.
- **D. Jha**, A. Paul, W. Liao, A. Choudhary and A. Agrawal. “**Transfer Learning Using Ensemble Neural Nets for Organic Solar Cell Screening**”, *International Joint Conference on Neural Networks*, 2019.
- **D. Jha**, L. Ward, Z. Yang, C. Wolverton, I. Foster, W. Liao, A. Choudhary and A. Agrawal. “**IRNet: A General Purpose Deep Residual Regression Framework For Materials Discovery**”, *25th ACM Conference on Knowledge Discovery and Data Mining (KDD)*, 2019 (under review).
- **D. Jha**, K. Choudhary, F. Tavazza, W. Liao, A. Choudhary, C. Campbell and A. Agrawal. “**Enhancing Materials Property Prediction by Leveraging Computational and Experimental Data using Deep Transfer Learning**”, *Nature Communications*, 2019 (under review).
- R. Egele, **D. Jha**, P. Balaprakash, M. Salim, V. Vishwanath and S. Wild. “**Scalable Reinforcement-Learning-Based Neural Architecture Search for Scientific Applications**”, *ISC High Performance*, 2019 (under review).
- **D. Jha**, L. Ward, A. Paul, W. Liao, A. Choudhary, C. Wolverton and A. Agrawal. “**ElemNet: Deep Learning the Chemistry of Materials From Only Elemental Composition**”, *Nature Scientific Reports*, 2018.
- **D. Jha**, S. Singh, R. Al-Bahrani, W. Liao, A. Choudhary, M. De Graef, and A. Agrawal. “**Extracting Grain Orientations from EBSD Patterns of Polycrystalline Materials Using Convolutional Neural Networks**”, *Microscopy and Microanalysis*, 2018.
- A. Paul, **D. Jha**, R. Al-Bahrani, W. Liao, A. Choudhary and A. Agrawal. “**CheMixNet: Mixed DNN Architectures for Predicting Chemical Properties using Multiple Molecular Representations**”, *NIPS Workshop on Machine Learning for Molecules and Materials*, 2018.
- S. Lee, **D. Jha**, A. Agrawal, and A. Choudhary and W. Liao, “**Parallel Deep Convolutional Neural Network Training by Exploiting the Overlapping of Computation and Communication**”, *IEEE International Conference on High Performance Computing, Data, and Analytics (HiPC)*, 2017 (Best Paper Nominee).

HONORS AND AWARDS

- **Royal E. Cabell Graduate Fellowship**, Northwestern (2013-2014).
- **Dean’s Commendation Fellowship**, Northwestern (Spring 2018).
- **Kul-Ratna Tuladhar Gold Medal and Nepal Vidya-bhusan Gold Medal** for highest standing in undergraduate engineering program among 3000 students, Tribhuvan University, Nepal.
- **Four Year Scholarship** based on merit for undergraduate engineering program, Tribhuvan University, Nepal (2007-2011).

SKILLS AND EXPERTISE

- **Programming Languages**: Python, C, C++, Java, C#, SQL, MATLAB, MPI, OpenMP, Go.
- **Machine Learning Tools**: TensorFlow, Caffe, PyTorch, Theano, Scikit-learn, Weka.
- **Large-scale data analysis**: MapReduce, Hadoop & Dumbo (Python interface).
- **Web Application Development**: HTML, CSS, JavaScript, Ajax/JQuery, PHP, ASP.NET, J2EE.