

SUMMARY	<b>Computer Scientist</b> working in <b>Machine Learning</b> with 10+ years of research experience.		
INTERESTS	Machine Learning, Deep Learning, Natural Language Processing		
EDUCATION	<b>Northwestern University</b> , Evanston, Illinois USA		
	Ph.D., Computer Science		<b>Sep '19</b>
	Master of Science, Computer Science		
	<b>Birla Institute of Technology &amp; Science</b> , Pilani, Rajasthan India		
	Master of Engineering, Software Systems		<b>May '12</b>
	Bachelor of Engineering, Chemical Engineering		
PROGRAMMING SKILLS	Proficient: Python, Keras/Tensorflow, Scikit-Learn, Dash/Plotly, Matplotlib/Seaborn, Pandas, FastAI, XGBoost/LightGBM, Shapley, NLTK, Gensim, Selenium Familiar: OpenCV, Spacy, PySpark, PyTorch, R, MATLAB, C, C++, Java, LAMP, SQL, weka, HTML/CSS		
PROFESSIONAL EXPERIENCE	<i>Machine Learning Scientist</i> , <b>American Family Insurance</b> , Madison, Wisconsin		<b>Oct'19-</b>
	<ul style="list-style-type: none"><li>• Designing insurance-based language models for predicting claims fraud</li><li>• Developed SARIMAX, LSTM and ESRNN forecasting financial metrics for next calendar year</li><li>• Develop a machine learning system for estimating motor vehicle violation risk</li></ul>		
	<i>Data Science Intern</i> , <b>Northwestern Mutual</b> , Milwaukee, Wisconsin		<b>Jun - Aug '18</b>
	<ul style="list-style-type: none"><li>• Developed distributed OCR algorithms for detecting responses from scanned questionnaires</li><li>• Designed a noise reduction algorithm to de-noise scanned and photocopied questionnaires</li></ul>		
	<i>Research Intern</i> , <b>Boeing Cybersecurity</b> , Sunnyvale, California		<b>Jun - Sep '13</b>
	<ul style="list-style-type: none"><li>• Generated synthetic user profiles with different demographic and interest features for analyzing ads across profiles</li><li>• Developed a machine learning model for predicting user demographics and interests from ads</li></ul>		
RESEARCH PROJECTS	<i>Research Assistant</i> , <b>Northwestern University</b> , Evanston, Illinois		<b>Sep '12 - Aug'19</b>
	<ul style="list-style-type: none"><li>• Chemical Property Prediction using Molecular Fingerprints (Tensorflow, Scikit Learn)<ul style="list-style-type: none"><li>◊ Developed a multi-input input neural network architecture by merging different molecular representations (SMILES and fingerprints) for predicting chemical properties and reduced the mean absolute error by half compared to state-of-the-art architectures (CheMixNet architecture)</li><li>◊ Designed Bagged Ensemble models for predicting power conversion efficiency of solar cells using chemical fingerprints, and achieved mean absolute percentage error between 1.5-2 %</li><li>◊ Developed a transfer learning solution to predict solar cell properties with mean absolute percentage error below 1 % (SINet architecture)</li></ul></li></ul>		
	<ul style="list-style-type: none"><li>• Developed Predictive Model for Additive Manufacturing (Tensorflow, Keras)<ul style="list-style-type: none"><li>◊ Created time series models for temporal analysis of temperature and heat flux data</li><li>◊ Investigated Recurrent Neural Network models to predict point-wise temperature information for accelerating additive manufacturing simulations</li><li>◊ Developed an iterative real-time predictive model using bagged decision trees</li></ul></li></ul>		
	<ul style="list-style-type: none"><li>• Ensemble Learning-based Guided Optimization for Aircraft Design (MATLAB, Python)<ul style="list-style-type: none"><li>◊ Created intelligent sampling algorithms to explore the constrained search space for candidate microstructures</li><li>◊ Developed Feature Ranking-based Technique for Search Space Reduction of Constrained Non-Convex Optimization</li><li>◊ Achieved 100x more solutions compared to state-of-the-art methods that can accelerate the design-to-experiment life-cycle</li></ul></li></ul>		
	<ul style="list-style-type: none"><li>• Classification of Anonymous Posts using Recurrent Neural Networks (Keras, Scikit Learn)<ul style="list-style-type: none"><li>◊ Developed customized vector model using crowd-sourced (Urban Dictionary) &amp; psycho-lingual (LIWC) dictionaries</li><li>◊ Explored Word2vec, GloVe and FastText embedding schemes (Gensim)</li><li>◊ Attained prediction accuracy of 79.8 % and 78.1 % using ensemble and LSTM models respectively</li></ul></li></ul>		

- K.Ness, **A. Paul**, L. Sun and Z. Zhang. “**Physics-based feature engineering for machine learning predictions of thermal fields in Additive Manufacturing**”, *Journal of Materials Processing Technology - Special Issue on AI in Advanced Manufacturing (under review)*
- Z.Yang, Y.Mao, D.Jha, **A. Paul**, W. Liao, A. Choudhary and A. Agrawal. “**Generative Adversarial Networks and Mixture Density Networks based Inverse Modeling for Microstructural Materials Design**”, *Science Advances (under review)*
- A.Dimri, **A.Paul**, D.Girish, P.Lee, S.Afra and A. Jakubowski. “**A Multi-input Multi-label Claims Channeling System Using Insurance-Based Language Models Expert Systems With Applications**”, *Expert Systems With Applications (under review)*
- R.Richards, and **A. Paul**. “**An Attention-driven LSTM Network for High Throughput Virtual Screening of Organic Photovoltaic Candidate Molecules**”, *Solar Energy*, 2021
- A. Paul**, W. Liao, A. Choudhary and A. Agrawal. “**Harnessing Psycho-lingual and Crowd-Sourced Dictionaries for Predicting Taboos in Written Emotional Disclosure in Anonymous Confession Boards**”, *Journal of Health Informatics Research*, 2021
- Z.Yang, D. Jha, **A. Paul**, W. Liao, A. Choudhary and A. Agrawal. “**A General Framework Combining Generative Adversarial Networks and Mixture Density Networks for Inverse Modeling in Microstructural Materials Design**”, *NeurIPS Workshop on Machine Learning for Engineering Modeling, Simulation and Design*, 2020
- D.Jha, L.Ward, **A. Paul**, W. Liao, A. Agrawal, A. Choudhary and C. Wolverton.“**ElemNet: Deep Learning the Chemistry of Materials From Only Elemental Composition**”, *Nature Scientific Reports*, 2018
- A. Paul**, M.Mozaffar, Z. Yang, W. Liao, A. Choudhary, J.Cao and A. Agrawal.“**A real-time iterative approach for temperature profile prediction in additive manufacturing processes**”, *6th IEEE International Conference on Data Science and Advanced Analytics (DSAA)*
- A. Paul**, D.Jha, R. Al-Bahrani, 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
- A. Paul**, A. Furmanchuk, W. Liao, A. Choudhary and A. Agrawal. “**Property Prediction of Organic Donor Molecules for Photovoltaic Applications using Extremely Randomized Trees**”, *Journal of Molecular Informatics*, 2019
- A. Paul**, P. Acar, W. Liao, A. Choudhary, V.Sundararaghavan and A. Agrawal. “**Microstructure Optimization with Constrained Design Objectives using Machine Learning-Based Feedback-Aware Data-Generation**”, *Journal of Computational Materials Science*, 2019
- 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**”, *NeurIPS Workshop on Machine Learning for Molecules and Materials*, 2018
- M.Mozaffar, **A. Paul**, R. Al-Bahrani, S. Wolff, A. Choudhary, A. Agrawal, K. Ehmann and J.Cao.“**Data-Driven Prediction of the High-Dimensional Thermal History in Directed Energy Deposition Processes via Recurrent Neural Networks**”, *Manufacturing Letters*, 2018
- J.Birnholz, N.A.R. Merola, and **A. Paul**. “**Is it Weird to Still Be a Virgin?: Anonymous, Locally Targeted Questions on Facebook Confession Boards**”, *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM, 2015.
- R. Liu, D. Palsetia, **A. Paul**, R. Al-Bahrani, D. Jha, W. Liao, A. Agrawal and A. Choudhary. “**Pinter-Net: A Thematic Label Curation Tool for Large Image Datasets**”, *Proceedings of the Workshop on Open Science in Big Data at IEEE Bigdata Conference*, 2016.

#### FELLOWSHIPS

McCormick Dean’s Commendation Fellowship	’18 Spring
Predictive Science and Engineering Design Fellowship	’16-’17
Segal Design Fellowship	’14-’15
Walter P. Murphy Fellowship	’12-’13

#### SELECTED TEACHING AND LEADERSHIP

<i>Teaching Assistant &amp; Guest Lecturer, Northwestern University</i>	Jan’14- Jun’19
<ul style="list-style-type: none"> <li>◊ Prepared and delivered weekly lectures for 20-50 students</li> <li>◊ Courses: Social Media Mining, Data Structures , Introduction to Programming (Python)</li> </ul>	
<i>President/Vice-President/Treasurer, Northwestern Toastmasters</i>	Sep ’15 -May ’18
<ul style="list-style-type: none"> <li>◊ Lead the Northwestern chapter of Toastmasters with over 30 graduate students, post doctoral fellows from 10 different departments</li> <li>◊ Co-wrote proposal to The Graduate school and obtained 3000 USD to fund programming</li> </ul>	
<i>Co-Facilitator, Northwestern Dialogue Group</i>	Oct ’16 - Sep ’17
<ul style="list-style-type: none"> <li>◊ Facilitated dialogue in safe spaces for cultural exchange across international and domestic students</li> <li>◊ Organized social events to enhance group cohesion</li> </ul>	