

Abhishek Kumar Mishra

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I am seeking a research internship opportunity in semiconductor domain, NLP, Data Science, and Machine Learning, where I can apply and hone the skills that I have acquired during my graduate study and work experience. As an intern, I would like to contribute to the company's productivity by solving problems using ML concepts.

EDUCATION

Drexel University, Ph.D. in Electrical & Computer Engineering (GPA – 4.0/4.0)

Philadelphia, PA (Aug 2020 -Sep 2024)

University at Buffalo, MS in Computer Science (GPA – 3.51/4)

Buffalo, NY (Aug 2018 -July 2020)

SKILLS

- Languages: Python, C++, SQL, R
- Tools/IDE: Jupyter, Tableau, Anaconda, AWS, Google Cloud Platform
- Libraries & Frameworks: NumPy, Pandas, scikit-learn, Matplotlib, Tensorflow, Keras, Pytorch, Dash, Scipy, Plotly, SpaCy, NLTK, VADER, TextBlob, Gensim, Beautiful Soup, Regex, Bokeh, Folium, Hadoop, MapReduce, Spark

WORK EXPERIENCE

Intel Corporation, Graduate Data Science Intern.

Austin, TX, USA (Feb 2022 – July 2022)

- Using parametric test data to minimize yield loss via Machine Learning:
 - We worked on building machine learning models using semiconductor test parametric data to reduce yield loss. To do so, I worked on screening anomalies for server product data in an unsupervised and supervised fashion with millions of skewed datasets using different machine learning models.
 - We created an end-to-end pipeline for pulling the data, pre-processing, training, and predicting.
 - We implemented several algorithms like LightGBM, CatBoost, XgBoost, MLP(6-layers), autoencoders, and Variational autoencoders. Of them, I got a performance score of ~62% F1 score with MLP.

North Park Innovation Ltd, Research Intern

Buffalo, NY, USA (May 2019 – Dec 2019)

- Finding the cause of malfunction of the HVAC system:
 - Designed a pipeline for the multi-class classifier to find the cause of the malfunction of the HVAC system, where I performed various tasks like data collection, data cleaning, and feature engineering.
 - Developed an understanding of the HVAC domain and worked on the multi-classification task (22 labels), where I employed various classifiers (Logistic Regression, Random Forest, SVM with linear kernel, ANN, and Ensemble).
 - The ANN outperformed, for malfunction detection, by a score of 81.35% macro precision & 80.21% macro-Recall compared to the rule-based client method.

Ericsson India Global Pvt. Ltd., Junior Data Scientist.

Mumbai, MH, India (Sep 2015 – Aug 2017)

- Around two years of work experience as a Junior Data Scientist in an agile environment with hands-on experience designing and implementing Machine Learning Algorithms.
- Predicted the network key performance indicator (KPI) for the client by developing a classification model based on the historical data for improvement and degradation of the network.
- Anomaly detection depending on the alarms to capture unusual site behavior of base stations, via a supervised learning model, significantly reduced the alarms by 30%. The model will prevent the faults from happening through early predictions and proactive decisions.
- Employed a Logistic regression model to identify the cause of weak network connection by performing a descriptive analysis to gain insights into the dataset, and analyzing significant features that highly impact the target, and achieving a 10% more precise prediction than the previous year.
- Created an interactive Dashboards and visualization for descriptive analysis.

PUBLICATIONS

- Predicting the Silent Data Error Prone Devices Using Machine Learning. Mohammad Ershad Shaik, Abhishek Kumar Mishra, Yonghyun Kim (<https://doi.org/10.1109/VTS56346.2023.10140097>) VTS 2023 (Worked during internship at Intel Corporation)
- Online Performance Monitoring of Neuromorphic Computing Systems. Abhishek Kumar Mishra, Anup Das, Nagarajan Kandasamy (<https://doi.org/10.1109/ETS56758.2023.10173860>), ETS 2023
- Hardware-Software Co-Design for On-chip Learning in AI Systems, M.L.Varshika, Abhishek Kumar Mishra, Nagarajan Kandasamy, Anup Das (<https://dl.acm.org/doi/10.1145/3566097.3568359>) ASPDAC 2023
- Built-In Functional Testing of Analog In-Memory Accelerators for Deep Neural Networks. Abhishek Kumar Mishra, Anup Das, Nagarajan Kandasamy (<https://doi.org/10.3390/electronics11162592>) Proceedings of Electronics 2022
- Does local pruning offer task-specific models to learn effectively? Abhishek Kumar Mishra*, Mohna Chakraborty* (<https://aclanthology.org/2021.ranlp-srw.17>) Proceedings of the Student Research Workshop Associated with RANLP 2021
- GLUMos: Noninvasive Glucose Monitoring Using a Wearable Spectroscopy Device Anush Niranjana, Amanda Watson, Tarek Hamid, Claire Kendell, Junpeng Zhao, Abhishek Kumar Mishra, Insup Lee, Nagarajan Kandasamy, submitted to Ubicomp-ISWC 2023
- Drug Overdose Vital-Signs Evaluator using Machine Learning. Anush Niranjana, Abhishek Kumar Mishra, Suman Kumar, David Gordon, Ayan Mandal, Jacob Brenner, Nagarajan Kandasamy, Amanda Watson, submitted to AAAI 2024

CURRENT RESEARCH PROJECTS

Application of open-world learning to textual classification

- Humans learn continuously, retain the learned knowledge, identify, and learn new things, and update the existing knowledge with new experiences, but for a machine learning model, it becomes quite computationally expensive. In real life, on online platforms like Twitter, and Instagram, where new topics emerge constantly, deployed trained model has to learn new categories to perform well from scratch, which incurs computation overhead.
- In this work, we propose a supervised approach, where rather than training the model to learn new classes from scratch, the model will be able to reject examples from unseen classes (which did not appear in training) and incrementally learn the unseen classes to expand the knowledge of the existing model.
- The proposed framework is based on a knowledge distillation approach that will reduce the computation overhead and make a knowledgeable learning system that learns cumulatively over time.

Weakly supervised framework for Emotion-cause Extraction.

- Emotion cause analysis, which aims to identify the reasons behind emotions, is a key topic in **sentiment analysis**.
- Working on implementing an **unsupervised framework** by modeling emotion terms to extract the clause using the **constituent parser** to generate **pseudo labels** and using **CCA** as a criterion to prevent the **model from overfitting**, along with **category detection** to remove **label noise and bias**.

Finding abnormal behavior in crossbar arrays.

- Executing a **DNN** involves a substantial amount of data transfer – **input-feature maps, synaptic weights, and matrix multiplication** results between the **off-chip memory and the processing cores**.
- Develop a **Machine Learning framework** to monitor the **correctness of a neuromorphic program's execution** using **model-based redundancy** in which a **software-based monitor** compares discrepancies between the **behavior of neurons mapped to hardware** and that **predicted by a corresponding machine learning model in real-time**.
- The approach will help to reduce the **additional hardware overhead** needed to support the **monitoring infrastructure** and **minimize intrusion** on the **executing applications**.

AWARDS

Poster Presentation IBM IEEE CAS/EDS – AI Compute Symposium, Oct 2022.

- Selected to present the "IBM IEEE CAS/EDS – AI Compute Symposium 2022" poster.
(<https://www.zurich.ibm.com/thinklab/AIcomputesymposium.html>)

REFERENCES

- **Dr. Anup Das** – Associate Professor (Advisor), Drexel University. Email: ad3639@drexel.edu
- **Dr. Nagarajan Kandasamy** – Professor (Co-advisor), Drexel University. Email: nk78@drexel.edu