Rafat Ashraf Joy

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Research Interests

Machine Learning, Generative Models, Scientific Computing, Computer Vision, Time Series Forecasting

Education

Shahjalal University of Science and Technology — Sylhet, Bangladesh
Bachelor of Computer Science and Engineering; GPA: 3.54/4.00 — Jan 2018 - Dec 2022

Courses: Data Structures, Algorithms, Operating Systems, Discrete Mathematics, Computer Architecture, Database Systems, Theory of Computation, Object Oriented Programming, Linear Algebra, Analytical Geometry, Calculus, Multivariate Calculus, Complex Analysis, Laplace Transform, Statistics, Machine Learning, Artificial Intelligence, Computer Networks, Communication Engineering, Data Science, Digital Signal Processing, Microprocessors, Compilers, Human Computer Interaction, Security

Standardized Test Scores

Graduate Records Examination (GRE) :

Total	Quantitative	Verbal	Analytical
328	169	159	4.5

International English Language Testing System (IELTS) :

Total	Listening	Reading	Writing	Speaking
8	9	8	7.5	7

Publications

1. **Fine Tuning the Prediction of the Compressive Strength of Concrete : A Bayesian Optimization Based Approach**, in IEEE Xplore. doi:10.1109/INISTA52262.2021.9548593

2. **An Interpretable Catboost Model to Predict the Power of Combined Cycle Power Plants**, in IEEE Xplore. doi:10.1109/ICIT52682.2021.9491700

Experience

Pioneer Alpha — Dhaka, Bangladesh
Software Engineer ML — July 2020 - Sep 2020

- Deployed ML models to productions utilizing Flask web framework.
- Got hands on experience with PyTorch framework.

Projects

osman: A pip package which lets data scientists/developers oversample class imbalanced binary data by using deep generative models. It offers two APIs, they are: WGAN-GP and Variational Auto Encoder. The APIs were written utilizing PyTorch framework. In future, diffusion model will be added to it

Super Resolution GAN for precipitation downscaling: A super resolution GAN based approach for converting low res precipitation data(for south asia region) to its high res equivalent. The low res data is 16*16 and the high res data is 64*64. PSNR and SSIM were used to measure the performance

Snap the Leaf: This web-app lets the users diagnose the disease of plants just by uploading the image of an infected leaf. Four deep learning models run in the backend of this web app, which will perform the prediction task. One model is Baseline CNN and other 3 models are Transfer learning based (DenseNet, ResNet, ImageNet). The deep learaning models were trained using Keras API on Tensorflow Backend.

Cloud Data Center Workload Estimation: This project is about forecasting the Workload of Cloud data center which are used in Business critical purposes. Along with Traditional statistical methods like ARIMA, several novel deep learning methods like RNN, LSTM, GRU and Temporal Convolutional Network(TCN) have been applied to the data. Among all these methods TCN achieved best performance in terms of MAE and RMSE value.

Interpreting Ising model: A CNN model was first trained to classify the two states of 2D Ising model. Then, LIME, a machine learning interpretability method was applied to extract insights about the model's decision making procedure.

Battery Voltage Predictor: A desktop GUI application built using PyQt5 to predict battery voltage from six features. Two machine learning models run under the hood of the application to make inferences. The machine learning models were trained on DFT calculated voltage data. In addition, the predictions are explained by SHAP, which is a machine learning interpretability library.

Skills

Languages: Python, Javascript, Scala, C++, SQL, Java
Frameworks: Flask, React JS, Express JS, Node JS
Libraries: PyTorch, Tensorflow, Scikit-learn, Numpy, Pandas
Others: Git, Linux, Latex

Personal Development

I have completed several MOOCs. A few of them to be mentioned:

1. Machine Learning with Python-From Linear Models to Deep Learning, by MITx on Edx
2. Mathematics for Machine Learning: Linear Algebra, by Imperial College on Coursera
3. Getting Started with AWS Machine Learning, by AWS on Coursera
4. Neural Networks and Deep Learning, by Deeplearning.ai on Coursera

In addition, I self studied advanced mathematical topics such as Convex Optimization and Topology.

References

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