MOHAMMED RAKIB

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Education

Doctor of Philosophy in Computer Science   **August 2023 – Present**
Oklahoma State University (OSU) - Stillwater, OK, USA   **GPA: 3.79**

Bachelor of Science in Computer Science and Engineering   **September 2017 – September 2021**
North South University (NSU) - Dhaka, Bangladesh   **GPA: 3.96**

Research Interest

- Computer Vision   • Multimodal Learning   • NLP   • Model Compression Techniques

Technical Skills

Programming Languages: Python, Java, C, C++, Shell Scripting, Arduino, HTML, SQL, x86 Assembly
AI & Data Science: PyTorch, TensorFlow, Keras, OpenCV, Scikit-learn, Hugging Face, Pandas, Matplotlib
Web Development: Django, FastAPI, Flask, Nginx, HTML, CSS, JavaScript
Version Control: Git, Bitbucket
Databases: MySQL, MongoDB, NoSQL, Redis
DevOps & Containerization: Docker, Kubernetes
Cloud Computing: Amazon EC2, AWS Services
Big Data Technologies: Hadoop, Apache Spark

Professional Experience

Data Scientist & Machine Learning Engineer   **September 2022 – July 2023**
NeovoTech Ltd.   *Dhaka, Bangladesh*

- Create crawlers to scrape news articles from various websites and store them in an AWS S3 bucket.
- Create, maintain, and deploy text translation and text summarization pipelines.

Machine Learning Intern   **June 2022 – August 2022**
NeovoTech Ltd.   *Dhaka, Bangladesh*

- Collaborated with colleagues to prepare a web crawler that crawls Swedish news text.
- Contributed to improving the Neural Machine Translation (NMT) pipeline from Swedish to English text.

Academic Experience

Graduate Research Assistant   **August 2023 – Present**
Complex Systems Lab, OSU   *Stillwater, OK, USA*

- Conducting research to refine soil moisture estimation techniques using crop imagery for a USDA-funded project.
- Exploring advancements in soil moisture prediction by adapting existing time-series models and modifying deep learning architectures to improve accuracy.
- Developing a multimodal forecasting approach by merging tabular meteorological data with soil imagery to elevate prediction reliability.

Graduate Teaching Assistant   **August 2023 – Present**
Computer Science Department, OSU   *Stillwater, OK, USA*

- Assisted in developing and grading course materials and managed the Canvas platform for efficient distribution and organization.
- Provided one-on-one mentorship during office hours, developed and maintained course websites, and participated in departmental meetings to discuss curriculum development.
- Engaged in professional development activities to enhance teaching effectiveness. Courses taught include:
  * Design & Implementation of Operating Systems 1 (Fall 2023)
  * Computer Science II - Intro to Object Oriented Programming (Spring 2024)

Research Assistant   **September 2021 – September 2022**
Apurba-NSU R&D Lab   *Dhaka, Bangladesh*

- Collaborate with fellow RAs to train, fine-tune, and deploy various deep learning models for image classification, OCR, ASR, sentence similarity, masked language modeling, QA, and NER.
- Conduct research in model compression techniques (pruning, quantization, and knowledge distillation), analyze findings, and present weekly reports.

Projects

Multi-modal Soil Moisture Estimation: A Distinctive Approach   **August 2023 – January 2024**
Research Member
- Introduced a new multimodal framework called Meteorological & Image Soil-Moisture Estimator (MIS-ME) that integrates image features from soil patches with their corresponding meteorological data to improve soil moisture predictions.
- Achieved at least 4% improvement in the MAPE scores for the soil moisture regression task compared to conventional image regression architectures like ResNet or MobileNet.

LILABOTI: Leveraging Isolated Letter Accumulations by Ordering Teacher Insights for Bangla Handwriting Recognition   **June 2021 – March 2022**
Research Member
- Introduced a new knowledge distillation method to eradicate the student model's bias toward major classes, where the student CRNN model is trained on an imbalanced handwritten word-level dataset by leveraging the insights from a teacher model trained on a balanced printed character-level dataset.
- Utilizing an inter-dataset evaluation protocol, achieved up to a 4% increase in the F1-Macro score for the minor classes and up to a 3.5% increase in overall word recognition rate when compared to the base CRNN model and conventional knowledge distillation approach.

Water Level Forecasting Using Spatiotemporal Attention-Based Long Short-Term Memory Network   **June 2021 – September 2021**
Research Member
- Demonstrated that Spatial-Temporal Attention LSTM (STALSTM) outperforms other types of neural networks in real-time water-level forecasting of complex river systems.

IoT Based Air Pollution Monitoring & Prediction System   **January 2020 – April 2020**
Project Leader
- Led a group of 3 to create an air pollution monitoring and prediction system that detects current pollution levels as well as predicts future pollution levels from the environment with high accuracy.
- Implemented ARIMA model to forecast pollution levels of pollutants.

An Open Source Contractual Language Understanding Application Using Machine Learning   **January 2021 – August 2021**
Project Co-leader
- Co-led a group of 4 to build an end-to-end legal contract review system where when a user inputs a contract, a deep learning model in the backend outputs a labeled contract with the types of clauses highlighted, allowing the user to make educated decisions.
- In charge of training, fine-tuning, and evaluating various transformer models along with deploying the best-performing one in a resource-constrained environment.

Cyclic Overlapping Lottery Ticket (COLT) – Undergraduate Thesis   **November 2020 – October 2021**
Research Member
- Collaborated with fellow members to develop a cyclic or iterative pruning algorithm based on overlapping weights of two one-half splits of a dataset to identify a sparse subnetwork that reaches accuracies similar to the original unpruned network.
- Demonstrated that COLTs can be generated in fewer iterations than Iterative Magnitude Pruning (IMP) of Lottery Ticket Hypothesis (LTH).
- Demonstrated that COLT found by partitioning a dataset into two parts can be transferred even on a third dataset, indicating that the proposed method generalizes well.

Awards and Honors

Summa Cum Laude Distinction at NSU for achieving a GPA of 3.96.

Academic Excellence Award at NSU, 2017 – 75% scholarship for Bachelor's degree.

2nd Runner Up - Bengali ASR Competition, DL Sprint - BUET CSE Fest 2022.

5th Place - Project Showcasing, MIST ICT Innovation Fest 2021.

Voluntary Activities

Assisted in fundraising for SCARS, a non-profit, to support the underprivileged, enhancing community support & donations.

Instructed Pytorch-based Deep Learning workshops, promoting skill development in neural networks.