Abu Adnan Sadi

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RESEARCH INTEREST

- Artificial Intelligence
- Deep Learning
- Natural Language Processing
- Machine Learning
- Computer Vision
- Healthcare Informatics

EDUCATIONAL QUALIFICATION

North South University, Dhaka, Bangladesh

Bachelor of Science in Computer Science and Engineering (BSCSE) | 2019 - 2022
CGPA: 3.82 (out of 4.00)

EXPERIENCE

Research Assistant
North South University, Supervisor: Dr. Mohammad Ashrafuzzaman Khan | September 2023 - Present
- Conducting research related to Natural Language Processing (NLP) and its application in the medical domain.
- Led a project that focused on developing an NLP-based assistive tool for performing automatic differential diagnosis.
- Currently working on a project that focuses on analyzing the weights of pre-trained transformer models to interpret their performance on downstream medical tasks.

PUBLICATIONS

Published:
- **Abu Adnan Sadi**, Ziaul Hossain, Ashfaq Uddin Ahmed, and Md Tazin Morshed Shad. "A Comparative Study on Plant Diseases Using Object Detection Models." In Science and Information Conference, pp. 419-438. Cham: Springer Nature Switzerland, 2024.
- Md Yearat Hossain, Ifran Rahman Nijhum, Md Tazin Morshed Shad, **Abu Adnan Sadi**, Md Mahmudul Kabir Peyal, and Rashedur M. Rahman, "An end-to-end pollution analysis and detection system using artificial intelligence and object detection algorithms," Decision Analytics Journal, vol. 8, p. 100283, 2023, doi: https://doi.org/10.1016/j.dajour.2023.100283.
- Md Yearat Hossain, Ifran Rahman Nijhum, **Abu Adnan Sadi**, Md Tazin Morshed Shad, and Rashedur M. Rahman, "Visual Pollution Detection Using Google Street View and YOLO," 2021 IEEE 12th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), New York, NY, USA, 2021, pp. 0433-0440, doi: 10.1109/UEMCON53757.2021.9666654.

Preprints:
- **Abu Adnan Sadi**, Mohammad Ashrafuzzaman Khan, and Lubaba Binte Saber. "Automatic Differential Diagnosis using Transformer-Based Multi-Label Sequence Classification." arXiv preprint arXiv:2408.15827 (2024).
- **Abu Adnan Sadi**, Labib Chowdhury, Nusrat Jahan, Mohammad Newaz Sharif Rafi, Radeya Chowdhury, Faisal Ahamed Khan, and Nabeel Mohammed. "Lmfloss: a hybrid loss for imbalanced medical image classification." arXiv preprint arXiv:2212.12741 (2022).

PROJECTS

Automatic Differential Diagnosis using Transformer-Based Multi-Label Sequence Classification.
Supervised by: Dr. Mohammad Ashrafuzzaman Khan
The project's aim was to utilize encoder-based transformer models to predict differential diagnoses based primarily on a patient's medical history and symptoms. We proposed an approach for transforming tabular patient data into textual patient reports to provide context to the language models. We fine-tuned models such as BERT, DistilBERT, RoBERTa, and Bio-BERT. We also designed several behavioral tests to stress test the models, identifying their limitations and areas for improvement for future research.

LMFLOSS: A Hybrid Loss for Imbalanced Medical Image Classification.
Undergraduate Capstone Project | Supervised by: Dr. Nabeel Mohammed
In order to address the imbalance issue of medical image datasets, we proposed a hybrid loss framework called LMFLoss. We performed a quantitative analysis of the performance of LMFLoss along with existing loss functions across multiple datasets and CNN networks. Additionally, we provide qualitative analysis using Grad-CAM attention maps and UMAP projections.

Visual Pollution Detection using Google Street View and Object Detection Algorithms.
Supervised by: Dr. Mohammad Rashedur Rahman
The goal of this project was to use object detection models for the automatic detection of visual pollutants present in the environment. We created a new 'Visual Pollutant Dataset' by manually collecting images of Dhaka city from Google Street View. We cleaned and annotated the images, and then fine-tuned object detection models to detect the pollutants. Our findings were published in the 2021 IEEE UEMCON conference and the Decision Analytics Journal.

A Comparative Study on Plant Diseases Using Object Detection Models.
Supervised by: Dr. Ziaul Hossain
We performed a detailed comparative analysis of the performance of different object detection models for plant disease detection. We preprocessed and annotated image data from two datasets to prepare a hybrid dataset. We compared the performance of multiple models such as YOLOv5, Scaled YOLOv4, and SSD. Our findings were published at the 12th SAI Computing Conference 2024.

TECHNICAL SKILLS

Languages: Python, Java, PHP, Javascript, C, C++
Frameworks: PyTorch, Laravel, Tensorflow
Python and ML Libraries: Scikit-learn, Hugging Face, OpenCV, Numpy, Pandas, Matplotlib, NLTK
Database: MySQL, SQLite
Version Control: Git, Github
Project Management Tools: Trello, Slack, Overleaf

RELEVANT UNDERGRADUATE COURSEWORK

Artificial Intelligence, Data Mining, Natural Language Processing (Special Topics), Data Structure & Algorithm, Design and Analysis of Algorithms, Introduction to Theory of Computation, Database Management System, Digital Logic, Discrete Mathematics, Computer Organization and Architecture, Operating Systems Design, Software Engineering, Concepts of Programming Language, Microprocessor Interfacing & Embedded System