MUHAMMAD EHSANUL KADER

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RESEARCH INTERESTS

Cloud Computing | Systems | Applied Machine Learning

EDUCATION

Bachelor of Science in Computer Science & Engineering

Bangladesh University of Engineering & Technology

April 2019 – June 2024

CGPA : 3.79/4.0

Notable Courses : Operating Systems | Computer Architecture | Networking | Compiler | Computer Security | Machine Learning | Artificial Intelligence | Bioinformatics | Information System Design | Database

WORK EXPERIENCE

Lecturer, CSE Department, Brac University

July 2024 –Present

Courses Teaching : Algorithms | Data Structures Lab | Introductory Programming Language Lab

RESEARCH AND PUBLICATIONS

Dependency, Deadline and Priority Aware Multi-Queue Dynamic Task Scheduling Using Heterogeneous Resources in Fog Environment

Task Scheduling | Fog Computing | 2023 - Current

- Proposed an algorithm for task scheduling in fog systems, addressing priority levels, deadline constraints, and task dependencies utilizing Directed Acyclic Graphs (DAGs), priority queues, and dynamic queue switching.
- Contributed to algorithm development by identifying limitations and making strategic adjustments to enhance performance.
- Implemented simulation programs in Java and recommended configurations for experiments.
- Simulation results showed significant improvements in response time, makespan, throughput, and task completion rate, particularly with tasks that have inter-dependencies.

This work is under review for publication.

MD-CardioNet: A Multi-Dimensional Deep Neural Network for Cardiovascular Disease Diagnosis from Electrocardiogram

Multidimensional CNN | Knowledge Distillation | 2022 - 2023

- Developed an efficient deep learning architecture with sequential 1D, 2D, and 3D feature extractors to capture intra- and inter-channel dependencies in ECG signals, improving cardiovascular disease detection accuracy.
- Introduced a novel knowledge distillation framework that transfers knowledge from a high-performing teacher model to a student model with significantly fewer parameters.
- Achieved satisfactory performance in the student model while maintaining efficiency and reducing model complexity.

Published in IEEE Journal of Biomedical and Health Informatics [DOI]

Forecasting COVID-19 cases: A comparative analysis between recurrent and convolutional neural networks

Neural Networks | Time Series analysis | 2020 - 2021

- Compared the forecasting capabilities of several deep learning models, including CNN, LSTM, GRU, and multivariate CNN, for predicting COVID-19 cases in three countries.
- While RNN models are generally recognized for their effectiveness with time series data, in our experiments CNNs outperformed them by effectively learning local data patterns, as indicated by performance metrics such as MSE, nRMSE, and MAPE.

Published in Results in Physics [DOI]

NOTABLE ACADEMIC PROJECTS

SyncInc Django DjangoREST ReactJS MaterialUI PostgreSQL Github

- Co-developed SyncInc, a web-based project management software, using Django-REST framework, Docker, PostgresDB, and ReactJS.
- SyncInc enables organizations to efficiently manage and track projects and tasks for enhanced collaboration.
- Allows admins to add members, create projects, and designate project leaders to assign and review tasks.

Music Instruments Classification Python PyTorch Librosa Github

- Developed a system to identify musical instruments in audio recordings.
- Processed raw audio with Librosa to generate Mel Spectrograms for feature extraction.
- Used a ResNet-18 architecture with additional layers to classify 20 different instruments.

Feature Implementation on OS xv6 C

- Added new features to xv6, including system calls for `trace` and `sysinfo`.
- Implemented a lottery scheduling algorithm for probabilistic time slice allocation.
- Enhanced memory management with Copy on Write (COW) and paging.

Compiler Bison Flex x86 Assembly Github

- Built a compiler for a subset of the C language
- Implemented key steps such as building a symbol table, creating a lexical analyzer with Flex, and developing a semantic analyzer with Bison, generating machine code for the x86 architecture.

FPL Analytica Django ReactJS Redux Oracle Github

- Co-developed FPL Analytica, a Fantasy Premier League replica, where users manage a squad with a limited budget, make transfers, adjust lineups, and join or create leagues to compete with others.
- Utilized the Django-REST framework for developing the API and Oracle for the database.
- Used React for the frontend and Redux for state management.

TECHNICAL SKILLS

- **Programming Languages:** C/C++, Java, Python, Javascript, x86 Assembly, SQL, Bash
- **Tools & Softwares:** Git, NS-2, CloudSim Plus, Autopsy
- **Frameworks & Libraries:** Django, DjangoREST, ReactJS, Material UI, Redux, OpenGL, PyTorch, Tensorflow, Sklearn, Pandas, Matplotlib
- **Database:** Oracle, PostgreSQL, Django ORM

HONORS & ACHIEVEMENTS

Dean's List

Recipient of Dean's List Scholarship for the year 2020, 2021 for academic excellence.

10th Position in BUET CSE FEST 2022 AI Competition

Built an AI that will fight with other AI's to win a game hosted in codingame platform