Hamza Rashid

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Education

Lahore University of Management Sciences (LUMS) Lahore, PAKISTAN
Bachelors in Electrical Engineering *Aug. 2019 – May 2023*

Lahore Grammar School Defence Lahore, PAKISTAN
GCSE A'Level *Aug. 2017 – May 2019*

Experience

Graduate Research Assistant June 2023 – Present
Center for Urban Informatics, Technology, and Policy (CITY)

- Conducted data collection through a combination of social media mining and manual surveys focused on flood-prone areas within the city of Lahore.
- Adapted raw TerraSAR-X satellite imagery for utilization in flood modeling, employing interferometry techniques within the SNAP software environment.
- Processed and analyzed flood data using Python, and presented results through visualization in QGIS.
- Implementing a weakly-supervised deep learning model for flood prediction, leveraging hydrological features as key inputs.

Undergraduate Research Assistant Jan. 2022 – May. 2023
Lahore University of Management Sciences

- Worked on Radio Frequency (RF) Vital Sign Sensing.
- Participated in land surveying for transit-oriented development project.
- Collected and labelled datasets for various projects, including road network data extraction using QGIS.

Undergraduate Teaching Assistant Jan 2022 – May 2022
Lahore University of Management Sciences

- EE-100: Engineering Laboratory
  - Assisted Dr. Momin Uppal as a Teaching Assistant during the Spring of '22.
  - Oversaw the guidance of approximately 100 students in Matlab-based programming assignments.
  - Responsible for evaluating lab tasks and conducting vivas for semester-long projects.

Projects

Urban Flood Susceptibility Mapping | *Deep Learning, SAR Imagery* June 2023 – Present

- Developing a flood susceptibility map for flood-prone regions with a spatial resolution of 30 meters, utilizing Sentinel 1 SAR and Sentinel 2 multi-band imagery, along with pertinent hydrological features of Lahore.
- Employing weakly-supervised learning techniques to address limited ground-truth data for more accurate flood predictions.
- Integrating rain data and global rain forecasting models to generate a warning system, offering timely alerts to local authorities of flood-prone areas.
- Conducting preprocessing of SAR and multi-band imagery using SNAP software, and visualized flood susceptibility outcomes using QGIS.

Air Quality Estimation Using GPR | *Senior Year Project, Machine Learning* June 2022 – May 2023

- Employed Gaussian Processes Regression (GPR) to construct a spatio-temporal PM 2.5 concentration prediction model, complemented by a uncertainty based recommendation system for placement of additional sensor, enhancing result precision.
- Generated hourly forecasts of PM 2.5 concentration over a one-month duration.
- Proficiently acquired and preprocessed raw sensor data, seamlessly integrating it into GPR model. Implemented the PyTorch library for seamless model training and testing.
- Executed the entire project independently.

Q-Learning based Educational App | *Course-project, Reinforcement Learning* Sept 2022 – Dec 2022

- Engineered a prototype for an educational application focused on teaching fundamental mathematics to children. Achieving correct answers aids in apprehending a simulated thief within a confined environment, while incorrect answers result in increased distance from the perpetrator in a reward-based Q-Learning game.
- Effectively introduced varying levels of difficulty by incorporating obstacles and rewards, stratified by the likelihood of encountering more challenging questions.
- Exhaustively trained the model within a 10x10 grid framework, comprising two pursuers and one evader. The pursuers endeavored to minimize their distance from the evader, while the evader aimed to maximize the separation from the pursuers.

RF Vital Sign Sensing | *Biomedical Signal Processing, Deep Learning* May 2022 – July 2022

- Developed a system utilizing RFID tags to monitor total body movement power, enabling classsification of an individual's activity state (e.g., running, walking, or resting).
- Collected data from 20 subjects, in all three states
- Trained a bi-directional LSTM for predicting respiration rate from total body movement power.

Laser Engraver | *Embedded systems, Micro-controllers, Course project* Sept 2021 – Dec 2021

- Developed a functional laser engraver model capable of translating binary-format images into intricately carved designs on cardboard.
- Programmed the activation sequences for laser operation and control of servo motors using assembly language on a custom micro-controller.

Technical Skills

Languages: Python, C/C++, HTML/CSS, R, Assembly
Softwares: QGIS, Proteus, SNAP,

References

Dr. Momin Uppal, Associate Professor, Department of Electrical Engineering, LUMS, momin.uppal@lums.edu.pk

Dr. Muhammad Tahir, Associate Professor, Department of Computer Science, LUMS, tahir@lums.edu.pk

Dr. Zubair Khalid, Associate Professor, Department of Electrical Engineering, LUMS, zubair.khalid@lums.edu.pk