Engr. Rafi Ullah Khan

Lab Engineer, Electrical & Computer Engineering Department, Pak Austria Fachhochschule: Institute of Applied Sciences and Technology (PAF-IAST), Haripur, Pakistan
rafi.ullah@fecid.paf-iast.edu.pk, rafikhanafridi742@gmail.com

Objective

Dedicated researcher interested in pursuing a research and teaching career that allows me to use my knowledge and interpersonal skills to benefit the humanity.

Field of Interest

Artificial Intelligence, Machine Learning, Deep Learning, Natural Language Processing (NLP), Computer Vision and Image Processing, Internet of Things (IoTs), Digital & Embedded Systems.

Education

Degree	University/Institute	Year	CGPA/Score
MS in Computer Engineering Thesis Title: **Fake News Detection Using Deep Learning**	Bahria University Islamabad Campus, (BUIC) Pakistan	2018-2021	3.83
BS in Computer Engineering FYP: **Automatic Miniature Self Driving Car**	Bahria University Islamabad Campus, (BUIC) Pakistan	2014-2018	3.06

MS Thesis Highlights

Title: Fake News Detection using Deep Learning

Classification of fake news content is one of the challenging problems of Natural Language Processing (NLP). In classification of fake news detection, the classes of true and fake news are predefined in which the news are assigned based on model's judgement. The increase in social media gave an edge to spreading of fake news easily. it has now become one of the considerable menaces to journalism, democracy and freedom of expression. In this era, fake news has emerged as a world topic, and it has become of major concern for the people to know the authenticity of a news content over the social media.

The existing content-based approaches such as rule based, probabilistic and machine learning are used for classification. These approaches are far from achieving acceptable accuracy with fake news

detection due to the complex nature of the news content that is generated to mislead the audience. These models require handcrafted features, which has the possibility of missing out the important features or considering the unimportant features. Secondly, these traditional models lack the ability of memory element to keep the track of previous words as well as current appearing words also known as words dependency, which is one of great importance in the classification of fake news.

This work present classification of fake news model that comprise of news content representation scheme also known word embeddings and deep learning model that represent the news articles as latent features of the text. The proposed model for classification of fake news is a blend of two deep learning models consisting of 1D Convolution Neural Network (CNN) as feature extractor and LSTM as classification model. Performance of this model is evaluated on three known datasets of fake news detection such as FakeNewsNet datset, ISOT dataset and FA-KES dataset.

Final Year Project Highlights

Title: Miniature Self Driving Car using Raspberry Pi

A self-driving car is a vehicle capable of sensing its environment and operating without human involvement. A human passenger is not required to take control of the vehicle at any time, nor is a human passenger required to be present in the vehicle at all. With the objective of achieving the goal to build a prototype self-steering car using neural network and OpenCV this project was implemented.

The project divided into two parts, in the first part a remote-control car converted to computer-controlled car using Arduino microcontroller and Pi camera mounted on the car to capture the images of the track to be followed. For model training purpose, these images were processed to get the region of interest (ROI) applying bounding boxes and fed to Neural Network in OpenCV using back propagation method to reduce the error. For object detection, Traffic signals and signs data was collected from different website. Shape based approach and Haar cascade classifier was used for the detection of traffic signs and signals. To avoid collusion we used ultrasonic sensor, which send distance measurement with other cars and objects on the road to initiate early stop message.

To receive image frame from raspberry pi, a server program runs on the processing end to receive image frames and to process them into NumPy. Once the model is trained on the fed data. It was tested on real time data to predict the self-steering into three directions i.e., Forward, left and right. The implementation of the project was carried out using python language.

Research Interests

- Optimization of AI, Machine/Deep learning models for Industry & Health care sector.
- Embedded systems using Artificial intelligent modelling for efficient utilization in industry & Health sector.
- Real Time detection and prediction modelling.
- Information retrieval techniques for Natural Language Processing related.
- Prognostics and systems health management using Internet of Things (IoTs).
- Robotics modelling for industrial and medical purposes.
- Digital signal and Image processing.

Experience

July 2021 – To Date: *Lab Engineer* in Department of Electrical and Computer Engineering, Pak Austria Fachhochschule: Institute of Applied Science and Technology, Haripur, Pakistan

- Beside teaching laboratory courses, also assigned the responsibility of establishing of labs for the department of E&CE department and figuring out the need of equipment for the labs.
- As a member of Outcome Based Education (OBE) committee it is also one of the responsibilities to keep the track of course learning outcomes and program learning outcomes for lab courses of the program.

March 2020 – July 2021: *Lab Engineer* in Department Computer Engineering, National University of Technology, Islamabad, Pakistan.

- Teaching of labs courses along with establishing of new labs for the department.
- Responsibility of OBE and modelling of lab courses according to OBE.

Semester Spring 2019 – Spring 2020: *Visiting Lab Engineer* in Computer Engineering Department at Bahria University Islamabad Campus, Islamabad, Pakistan.

- Teaching Laboratory courses of Computer Engineering courses.

Semester Fall 2019 – Spring 2020: *Visiting Lab Engineer* in Software Engineering Department at Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST), Islamabad, Pakistan.

- Teaching laboratory courses related to computer science courses in department of software engineering.

Certification

- Python (Coursera)
- Computer Vision and Image Processing – IBM (Coursera)

Laboratory Courses Taught at Undergrad level

- Computer Programming (Python & C++)
- Artificial Intelligence Lab (Python)
- Introduction to Data Science (Python)
- Introduction to Embedded Systems (Arduino - Assembly & C, Raspberry Pi - Python)
- Digital Logic Design (Hardware & Verilog)
- Digital System Design (FPGA-Verilog)
- Digital Image Processing (MATLAB)
- Signals and Systems (MATLAB)
- Digital Signal Processing (MATLAB)
- Computer Organization and Assembly Language (Assembly Language)
- Introduction to Data Mining (Python & MATLAB)
- Object Oriented Programming (C++)
- Data Structures and Algorithms (C++)

Learning Tools Used & Trained Students on

- MATLAB
- PyCharm, Spyder, Colab, Atom
- Xilinx ISE, Vivado
- Proteus, ModelSim
- FPGA (Spartan 3, Spartan 6, Basys 3)
- Raspberry Pi, Arduino
- PIC Microcontroller

Programming Languages Taught

- Python
- MATLAB
- C++/C
- Verilog HDL
- Assembly Language
- Block Coding

Skills

- Implementing AI, Machine and Deep Learning models in Python & MATLAB programming.
- Digital Image processing using python and MATLAB.
- Sensor's integration with various microcontrollers and SBCs and operating using IoTs.
- Signal and Digital signals processing using MATLAB.
- MS Word and Latex for documentation.
- Good command on English Language.

Awards

- Awarded two-time Merit Scholarship in MS Computer Engineering at Bahria university Islamabad Campus for Obtaining 4.0 GPA.

References

- **Dr. Shehzad Khalid**, Senior Professor, Department of Computer Engineering, Bahria University Islanabad Campus, Pakistan. shehzad@bahria.edu.pk.

- **Dr. Zahid Ullah**, Associate Professor & Chairman of Electrical and Computer Engineering Department, Pak Austria Fachhochschule: Institute of Applied Science and Technology, Haripur, Pakistan, zahid.ullah@fecid.paf-iast.edu.pk.