MARIA ZAFAR

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Education

South East Technological University (SETU), Carlow Ireland   **DECEMBER 2023 – DATE**
PhD Sustainable Deep Neural Networks in Machine Translation

Institute of Business Administration (IBA), Karachi   **AUGUST 2019 – JUNE 2022**
MS Computer Science, CGPA 3.46

Kinnaird College For Women (KC), Lahore   **AUGUST 2009 – JUNE 2013**
BS Computer Science, CGPA 3.03

Beacon-house School System, Lahore   **AUGUST 2006 – JUNE 2008**
GCE A-Levels, Grades- 3Bs

Beacon-house School System, Gujranwala   **AUGUST 2004 – JUNE 2006**
GCE O-Levels, Grades- 1A, 2Bs, 4Cs, 1E

Professional Experiences

ADAPT Centre- Phd Researcher- MT & LLMs   **DECEMBER 2023 TO DATE**

PhD in Sustainable Deep Neural Networks, sponsored by SETU Ireland, to optimize the utilization of resources in MT.

SensViz- Deep Learning & Machine Learning Engineer   **SEPTEMBER 2021 TO DATE**

Responsible for implementing ML & DL models based on requirements i.e., Age Prediction on image and video datasets using VGG16, ResNet. Trained the Object Detection, OCR, and Text Classification models on TensorFlow lite for mobile application using YOLOV4 and BERT, the application involved Text Classification from the Street board. And several other applications have been implemented in COLAB, Jupyter Lab and Notebooks using Tensorflow, Keras, Pytorch, Open-CV, Sklearn models, Spacy, Pandas, NumPy

Devaj Technology- Senior Python Developer- Part-Time   **JUNE 2022 TO OCTOBER 2022**

Developed a mature chatbot using NLP based techniques, extracting NER following the text cleaning techniques i.e., Lemmatization, stop words removal using NLTK, Spacy, Textblob, Pandas in Python. The developed API brings products information directly from catalogue from user's simple query by segmentation of the keywords like products, cloths, medicines etc. Furthermore, deployed the model on AWS and provided the API to the frontend to integrate that data into any chatbot.

MarketLytics- Digital Analyst Trainee   **SEPTEMBER 2021TO FEBRURY 2022**
Conducted Audits for the data collected in Google Analytics 3&4, Did implementations on GTM for ecommerce websites.

IBA Karachi- Graduate Teaching Assistant   **JANUARY 2021 TO DECEMBER 2013**
Assisted instructor in courses like Intro to Data Mining and Software Project Management (SPM). Responsibilities included: Gathering course material, Aggregating marks and In SPM played the role of a virtual client for a Software Development Project by linking theoretical aspects of the course to practical implementation.

Eagale Solutions- Web Developer .   **NOVEMBER 2018 TO JULY 2019**
Developed an admin panel and APIs for accounts management and ERP applications in PHP with MVC framework in Code Ignitor using MySQL and Frontend with JS (native –invoked from browser) and bootstrap 3

Eagale Solutions- Content Writer   **MARCH 2016 TO AUGUST 2017**
Wrote contents for webpages and technical reviews. Managed technical documentation i.e. employee contracts, NDAs and software requirement documents. Performed QA of their software products through testing techniques.

GIFT University- Research Assistant   **JUNE 2014 TO FEBRURY 2016**
Team Lead on PSSP funded project "Analysis of Consumers' Response for Deployment of Demand Side Management in Pakistan". Researched and prepared summarized reports. Collaborated with team of undergrad students to identify relevant questions, demographics and determine methods of collection. Tested the simulator.

LUMS- Research Assistant   **JANUARY 2013 TO JUNE 2013**
Researched on the simulation of Demand Response technique using Case Base Reasoning to forecast the power consumption of devices and implemented a web-based simulator in PHP and JAVA as my senior year project.

Projects

- **CHATBOT using LLMs i.e., LFQA & DPR:** Automated the training processing for chatbot to remove human intervention and interruption during training. The final product involved creating a question-and-answer generation chatbot for solving issues in cars. The next phase of this project involves applying RL to the existing approach, which is an ongoing phase.
- **FEDERATED LEARNING USING BERTNILM**: Applying federated learning to household datasets to predict the electricity consumption of devices at different houses. The project is to apply the Fed Averaging Algorithm to the BERT model. The dataset consisted of 5-6 houses that functions as separate clients to train the global model collaboratively. The number of clients were to be increased, by considering each day or week of data as a separate client.
- **XAI for Object Detection Model**: The aim of the project was to determine the explanability of an object detection model to find transparency in its output. We chose YOLOV5 and applied SHAP to figure out which features were counted as important by the model.
- **AUTOMATIC FILLING OF A PRODUCT FORM IN AN E-COMMERCE APPLICATION FROM A VIDEO.** This work lets users add their products on a platform by recording a video of the product which mentions its features instead of filling out the traditional web-forms. As a result, by adding the video to the platform, all the details of the product are auto-filled intelligently by the system. The model used was our custom trained YOLO v5 model on the COCO dataset. For video to audio conversion ffmpeg was used and Deep speech model to convert speech to text.
- **Dental Disease detection using CNNs.** Classified teeth with disease and no disease using CNNs. The dataset involved DICOM images. The model had 5 convolution layers and 3 activation layers.

MS PROJECT,
- **Developed an Ecommerce chatbot using Python. Also explored RASA for the same problem. The chatbot was developed using both approaches Self-Learning and Pattern Matching. For Self-Learning BOW algorithm with DNNs was used**

TEXT ANALYTICS,
- **Developed question answering system that provided answers to user's queries using text similarity on children's stories. The models were trained on the corpus at sentence, paragraph and document levels using LSI, Spacy and customized Word2Vec and Gensim's Doc2Vec.**
- **Performed clustering and topic modelling using LSA for different number of K on news headlines. Identified the ideal number of clusters using different intrinsic measures (silhouette coefficient, scree plot, etc.) and using a mixture of K-means, Affinity Propagation and Dendrogram based approaches.**
- **Developed automated question generation application that generated factoid questions [Who, When, What, Where etc.] on primary school level text/stories.**

DATA SCIENCE PRODUCT DEVELOPMENT,
- **Implemented Automatic Checkout on Retail using object detection model YOLOV5, the project was Dockerized and deployed on Azure cloud.**

DEEP LEARNING,
- **COVID detection using Spatial Transformer Networks i.e., Affine Transformations, layering with CNN on tensorflow keras**
- **Used LSTM architectures to train and predict the temperature for Room based on previous temperature of the room using time series.**
- **On the dataset of images, 'X's and 'O's tested a CNN based Deep Neural Network with different architectures.**

- **Compared Gradient Descent and Stochastic Gradient Descent (SGD) through implementation and tested over different parameters i.e., learning rate, epoch etc to evaluate both.**

MACHINE LEARNING,
- **Created a template for machine learning consisting of multiple pipeline on the following dimensions on python:** Different feature selection methods (RFFS, RFE, MIFS and PCA), Cross Validation and Manual Split, Different algorithms (Random Forest, Gradient Boosted Classifier, ADABOOST, XGBOOST, SVM, K-NN, Decision Tree, Naive Bayes and Logistic Regression)

- **Conducted Exploratory Data Analysis(EDA) on different datasets e.g. sales,** – while understanding data, dealt with data cleaning which included, missing value analysis, dealt with incorrect/inconsistent values, string columns, useless columns and rows, Date-time analysis, T-test, ANOVA, correlation analysis

NATURAL LANGUAGE PROCESSING,
- **Implemented Naïve Bayes Text Classifier.**
- **Sentence Segmentation Implementation using a Binary Classifier.**

ARTIFICIAL INTELLIGENCE,
- **Urdu OCR** using artificial neural network,
- **Template matching** through evolutionary algorithm,
- **Inheritance laws of Quran** as an expert system using prolog,
- **Rule base** from association rules extracted from software defect data.

BIG DATA ANALYTICS,
- **Created an Apache Impala lab On Cloudera Docker container.**
- **Implemented Hadoop single node map reduce on Cloudera's Docker.**
- **Hands-on with MongoDB, REDIS, Linux shell scripting and Docker exercises**
- **Theoretically converted Zeta architecture to Lambda of E-taxi service, Uber.**

Skills

LANGUAGES & TECHNOLOGIES
Python, LINUX, Java, MATLAB, C/C++, CODEIGNITOR (AJAX & JavaScript), HTML & CSS, MySQL and SQL Server, Latex, Visual Basic, MS Office. Web Application Development, E-commerce website with admin panel.

Extra-Curricular Activities and Achievements

PUBLICATION(S) ACCEPTED IN I.J. INFORMATION ENGINEERING AND ELECTRONIC BUSINESS, 2023, 2, 1-10- TITLED, Developing Smart Conversation Agent ECOM-BOT for Ecommerce Application using Deep Learning and Pattern Matching

PUBLICATION(S) ACCEPTED IN 7TH CONFERENCE ON APPLIED ENERGY-ICAE2015- TITLED, CBSF: a framework for accurate simulation of appliance data for future smart grid application

OTHERS
- Played Badminton tournament'21 at IBA.
- Attended workshops on Theoretical Computer Science & Mathematical simulation in LUMS & FC College.
- Participated in LUMS PSIFI and secured 3rd position in Math Gauge.
- Received Silver Medal for scoring highest marks in Additional Mathematics by Beacon house School System in O level