Muhammad Ali Abbas

Lead Machine Learning and Gen. Ai Engineer

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Work Experience

Idrak Ai Ltd.

Senior Machine Learning Engineer / Team Lead

- Tech: Huggingface, PyTorch, Lora, Ollama, Langchain, LlamaIndex, RASA, Optuna, PFET, Mongo DB, GROQ, FastAI, Qdrant, Langgraph, Livekit
- Developed **Realtime Multimodal Agents** using **LiveKit** and **LangGraph** as Co-Pilot for **sales optimization**, tailored for various **website agents**.
- Designed and developed outbound and inbound **Calling Bots** tailored for **call center** operations based of Retrieval Augmented Generation (**RAG**) as NLU Engine.
- Developed a Digital Help Desk utilizing GraphRAG, Langchain, and Qdrant as the vector database.
- Developed an Langchain **ReAct AI** agent to humanize LLM-generated text, providing tone suggestions and corrections for technical writing.
- Fine-tuned Tiny Llama and Llama 3 for enhanced performance using ORPO method.
- Achieved a latency reduction to 0.1 sec for Whisper ASR, and Style TTS through chunking and quantization.
- Fine tuned ASR and TTS models including Wave2Vec, Whisper; And Parler TTS and SoVits
- Engineered a Call Analytics dashboard featuring Speaker Diarization (pyannote) and text retrieval FAISS.
- Enhanced classification accuracy by up to 18% using Sentence-BERT.

Safebeat Rx

Machine Learning Engr

- Tech: PyTorch, FastAI, OpenCV, Numpy, Matplotlib, Sklearn, NeuroKit, DWT, time series data, Trustworthy AI
- Collaborated in a team to develop a real-time **ECG monitoring device** connected to dashboard.
- Achieved a 4% increase in ECG QTc measurement accuracy using Deep Learning techniques.
- Developed a method for converting **ECG images** into **time series signals** for analysis.
- Implemented ECG signal classification utilizing 1D ResNet.
- Detection of longest Beat from ECG Signal for correct measurement of R-R Distance.

ML Trade

Machine Learning Developer

- Tech: Python, FastAI, OpenCV, Ninja Trader, Flask, Time series processing, Transfer learning, Multimodal, C#
- Developed **ensemble classification** systems for Trade Type prediction.
- Created AI-based trading indicators with 80% accuracy.
- Integrated AI inference systems into a C#-based Python application.

Education

University of Lahore

 Masters in Computer Science
 3.55/4.0 CGPA

 * Thesis: Diagnosis of Pneumonia using Hybrid algorithm from Chest X-Ray Images.
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 * Course Projects: University Bus Route Optimization using Genetic Algorithm, Deep RL based Cart Pole Agent.
 2017

 University of Sargodha
 2017

 BS Information Technology
 3.59/4.0 CGPA

 * FYP: Sign Language recognition using Shape Moments analysis.
 8

 Research Work
 2017

A Novel-based Swin Transfer Based Diagnosis of COVID-19 Patients

Intelligent Automation & Soft Computing (DOI: 10.32604/iasc.2023.025580)

Fine-tunned Swin Transformer for efficient COVID-19 patient prediction based on chest X-ray images using Transfer learning, achieving 98% recall and 96% accuracy, outperforming state-of-the-art techniques.

Used TuRF for predicting health affecting factors in pandemics.

Life , MDPI (DOI:10.3390/life12091367)

Evaluated COVID-19's impact on student health using **Neural Networks**, **Boosting** and **TuRF** feature selection. Found weight maintenance and healthy activities as two main factors , achieving **90% accuracy** in prediction.

Aug 2020 - May 2021

Edrees, Ali, Maryam, et al.

Saeed, Ali, Maryam et al.

July 2021 - May 2022

Oct 2022 – Present

Remote

Remote

Remote

2021 5// 0 CGPA

2022

2022

Comparison of Machine Learning Methods for the Diagnosis of Motor Faults

Journal of Nondestructive Evaluation (DOI: 10.1007/s10921-022-00856-3)

Demonstrated improved performance of the Automated Spectrum Features Extraction Algorithm (ASFEA) across various machine learning models including **SVM**, **XGBoost**, and CNN, achieving classification accuracies up to 95%, markedly surpassing traditional diagnostic methods.

Hybrid deep learning Approach to diagnose pneumonia in Chest X-Rays 2020 MedRxiv (DOI: 10.1101/2020.12.03.20243550) Ali, Usama, Arsalan et al.

Developed a hybrid machine learning vision-based model integrating **CNNs** and **tree-based** algorithms, achieving up to 97.78% diagnostic accuracy in pneumonia detection from pediatric chest X-ray images.

AI-Based Histopathological Diagnosis of Lung Adenocarcinoma & Colon Cancer

MedRxiv (DOI: 10.1101/2020.05.02.20044602)

Employed six state-of-the-art CNN architectures, including VGG-19, AlexNet, and multiple ResNet models, to achieve diagnostic accuracies exceeding 97% in classifying 15,000 histopathological lung images.

Projects

Calling Agents

- Implemented both inbound and outbound multilingual calling bots, achieving a 6% increase in sales and up to 90% accuracy. These outbound bots significantly enhance human accuracy and also they are tailor made.
- Tech: Python, Pytorch, Huggingface, Inclusive AI, Langgraph, Langchain, Function Calling

PillWise

- Developed a Llama Index Multimodal RAG agent model utilizing the DrugBank database, paired with a mobile app that **detects** and identifies medication images and user can **talk** about it.
- Tech: langchain, llamaindex, qdant, flutter, yolov8, FastApi, Langgraph

CFO-II

- Developed multi-model voice-to-voice agent for Financial Analysis based on RAG and Function Calling
- Tech: Langgraph, Langchain, Function Calling, Livekit

Text based Audio Cropper

- Utilizes FastWhisper for transcription, Pyannote Diarization for speaker identification, and fastapi for request handling, WhisperX for word level timestamps.
- **Tech:** WhisperX, Pyannote, PyTorch, librosa, soundfile-python,FastApi

Bert and GPT2 Family Models Pre-training for Papia Language

- Repository facilitates **easy** user **interface** with CSV input for **training** custom **tokenizers** and models using Hugging Face Transformers, specifically tailored for Papia language.
- Tech: Accelerate, Hugggingface, datasets, Jupyter Notebooks, Pytorch, BERT, GPT2, ROBERTA

Search Engine based on Syntax and Contextual Similarity

- Text Retrieval and classification using fuzzy matching, Sentence-BERT (SBERT) embedding and hybrid approach.
- Tech: SBERT, Fuzzy Matching, FAISS, Streamlit

(OB/GYN) Exam Prepration Bot

- Developed Exam preparation Chatbot based on Lang graph and Graph RAG to help user in exam and Interview prepration
- Tech: Graph RAG, neo4j, Langchain, Langgraph, Function Calling,

Certificates

Retrieval Augmented Generation for Production with LangChain & LlamaIndex by Activeloop Training and Fine-tuning LLMs for Production by Activeloop, llamaindex and Intel

Langgraph by Langchain acadmy

References:

Dr. Syed Usama Khalid CEO Idrak Ai Ltd — syedusama@gmail.com

Dr. Syed Safwan Khalid Director Idrak Ai Ltd — safwan@idrakai.com

Dr. Maryam Zaffar Assistant Professor / HOD Software Engineering Ibadat Islamabad — hod.cs@iiui.edu.pk Shafaan Khaliq Bhatti Lecturer University of Sargodha — shafaan.khaliq@uos.edu.pk

github repo

demos calls

github repo

github repo

github repo

github repo

github repo

2021

Irfan, Khuram, Ali et al

Ali. Usama. Asmara et al.

2020