

# Ashley Alex Jacob

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Machine Learning Researcher specializing in deep learning, distributed systems, and medical image processing. Builds scalable data pipelines and trains models that tackle real world problems in healthcare and data-intensive domains. Experience spans the full ML lifecycle from wrangling complex datasets to deploying production ready models. Focuses on making research reproducible and practical, bridging the gap between cutting-edge methods and deployable solutions. Core expertise include Deep learning architectures, big data infrastructure, medical imaging, distributed training, and rigorous experimental design.

**Research interests** Artificial Intelligence, Machine Learning, Deep Learning, Big Data, Data Science, Social Media Analytics, Computer Vision, Generative AI, AI in Healthcare Applications

**Education** **Institute of Management Sciences** Peshawar, Pakistan

Master of Science in Data Science Sep 2023 – Aug 2025

CGPA: 3.80/4.00

Relevant Coursework: Advanced Digital Image Processing, Big Data Analytics, Advanced Natural Language Processing, Machine Learning, Artificial Intelligence, Distributed Data Processing.

**University of Engineering and Technology** Peshawar, Pakistan

Bachelor of Science in Computer Systems Engineering

Sep 2018 – Aug 2022

CGPA: 3.64/4.00

Relevant Coursework: Digital Image Processing, Data Analytics, Cloud Computing, Data Structures and Algorithms, Database Management Systems, Digital Signal Processing

**Industry experience** **K2X Tech** Data Science/ML Peshawar, Pakistan

Machine Learning Engineer (Team Lead)

Aug 2022 - Present

- Architected a scalable big data infrastructure for NISR (Rwanda) to advance their national data system vision for mobile positioning data analysis, designed distributed processing pipelines using Spark and Kafka, and conducted technical training workshops enabling their team to independently implement and maintain fault-tolerant systems.
- Engineered an AI-driven Customer Service Chat Platform and an AI Assistant for Sleeknote's web campaign builder, leveraging OpenAI's GPT model through advanced prompt engineering, enhancing service experience by fivefold.
- Developed and fine-tuned predictive models for Forecastly.ai using advanced time series algorithms, reducing waste and optimizing resources in the hospitality industry.
- Led the development of a sophisticated company recommender system employing Google BERT, improving performance metrics and user engagement through a low-latency prediction pipeline.
- Finetuned an OCR model for Urdu text to 70% accuracy and integrated it into a real-time media monitoring system for the Government of Khyber-Pakhtunkhwa.
- Led the team of AI/ML Engineers, Data Analysts and Python Engineers at K2X Tech to execute AI product design and development.

#### Teaching experience

##### **Saylani Mass I.T Training Program**

Peshawar, Pakistan

AI Instructor

Jan 2025 - \*

- Conducted hands-on training in Programming, Data Analysis, and Machine Learning for a diverse batch of 70+ students, including matriculation, college, and university learners.
- Designed and delivered practical AI sessions, emphasizing real-world applications and projects to enhance problem-solving and analytical skills.

#### Research Projects

##### **Autonomous Framework for Pediatric Brain Tumor Segmentation Using Advanced Deep Learning Techniques (MS Research)**

- Investigated the effectiveness of vision foundation models, specifically Medical Adaptation of Segment Anything Model (Med-SAM), for pediatric brain tumor segmentation using the BRaTS 2023 dataset.
- Developed a comprehensive evaluation framework involving fine-tuning, data pre-processing, and testing to compare Med-SAM against established 3D-UNet architecture.
- Demonstrated Med-SAM's superior segmentation accuracy (DSC: 70.89%, IoU: 68.02%) over 3D-UNet, highlighting the potential of foundation models for medical imaging under limited data availability, a common constraint in healthcare.
- Contributed to medical image segmentation research by establishing that foundation models can achieve better segmentation results for treatment planning of fatal diseases, while identifying limitations in handling very small or irregular tumor regions for future work.

#### **Healthcare 360° - Final Year Project - UETP**

Github: [Healthcare-360](#)

- Healthcare 360 is a one-stop solution for medical diagnostics through non-invasive techniques harnessing the power of data (medical imaging) and machine learning.
  - Fine-tuned machine learning models using Microsoft Azure Cloud Platform for medical diagnostics for diabetic retinopathy and COVID-19 and other medical conditions.
  - Integrated and deployed all the machine learning models into a robust mobile application.

Pediatric Bone Age Prediction System - Pasteur AI

Github: Bone-Age-Prediction

- Collaborated with a computational biologist from Cooper University to develop a machine-learning system for radiologists to predict bone age from X-ray scans.
  - Performed exploratory data analysis on the dataset to understand the nature of the data and based on the analysis applied various deep-learning models for the problem and evaluated them using techniques like Grad-Cam.

## Predicting Chordoma Metastasis Using RSNA Gene Expression Data and Machine Learning

- Conducted research to predict chordoma metastasis using RNA sequencing data, applying feature reduction techniques and training models like SVM and Random Forest, achieving an accuracy of 88.63% with the Random Forest model.

## Publications

**Jacob, A. A., Nawaz, M., Khattak, M. A. A., Ahmed, I.** *Med-SAM vs. 3D U-Net: A Comparative Study of Vision Foundation Models for Pediatric Brain Tumor Segmentation.* (Manuscript Ready)

**Jacob, A. A., Azam, M. A.** Review on the Synergy between Blockchain and Distributed Systems: Distributed Databases and Challenges. (In Progress)

**Jacob, A. A., Arif, S., Ahmed, I., Azam, M. A., Farooq, S.** *Predicting Chordoma Metastasis Using Gene Expression Data and Machine Learning.* (In Progress)

### Honors and Awards

National Winners - Microsoft Imagine Cup Pakistan - Healthcare 360 2022

World Finalists - Microsoft Imagine Cup Pakistan - Healthcare 360

Winner - Youth Innovation Challenge COVID-19 Edition 2020

## Skills

Technical

**Programming Languages:** Python, SQL, JavaScript, Dart

AI Platforms: OpenAI, Azure OpenAI, Hugging Face, Retell AI, Assembly AI

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**Frameworks & Libraries:** TensorFlow, Keras, PyTorch, Transformers, MLFlow, DVC, Langchain, Llama Index

**Backend/Pipelines:** FastAPI, Flask, Kafka, Airflow, Spark, PostgreSQL, MongoDB, FAISS, Redis

**Cloud/CI-CD/Monitoring:** AWS, Azure, Docker, GitHub Actions, Jenkins, Databrick, Grafana

**Interpersonal**

Problem understanding and Solving, Solution Design, Team Leadership, Public Speaking, Networking.

**Languages**

English (fluent), Urdu (native)

**Volunteer****Co-Lead Microsoft Learn Student Ambassadors (MLSA) UET Peshawar Chapter**

Jul 2021 – Jul

2022

Spearheaded community activities that resulted in the UET Peshawar chapter becoming the top MLSA community in Pakistan. Organized and executed key events, including Microsoft Ignite, fostering a thriving peer-to-peer learning environment.

**References****Dr. Irfan Ahmed**

Lecturer, University of Engineering and Technology, Peshawar, Pakistan

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**Dr. Muhammad Abeer Irfan**

Research Fellow, TU Dublin

Senior Lecturer, University of Engineering and Technology, Peshawar, Pakistan

Email: muhammad.irfan2@tudublin.ie

**Dr. Muhammad Nawaz**

Professor, IMSciences Peshawar, Pakistan

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