

# Zohaib Khan

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## EXPERIENCE

### Research Associate - Machine Learning

Jan. 2022 – Present

*Lahore University of Management Sciences*

- Developed an advanced mechanism to **enhance Group Query Attention (GQA) in Transformers**, leading up to an **8% improvement in Image Classification** performance ([WIP Paper](#), [PyTorch Code](#)).
- Designed methodologies and experiments to **probe LLMs for social biases**, leveraging **synthetic data** and evaluating win rates of outputs tied to social groups ([Paper](#)).
- Architected large-scale inference pipelines with translation and human-in-the-loop components, and **evaluated several LLMs** (including OpenAI's GPT family and Meta's Llama-2 family) for **fact-checking and multilingual generalization** on a large scraped dataset over multiple **prompting** strategies.
- Managed logistics, **supervised student teams on research projects**, and worked on inter-university collaborations as a **Lab Lead** for CSaLT at LUMS.
- Led as the **Head Teaching Assistant** for three graduate-level courses on Machine Learning, Generative AI, and ML Research, **managing teams of up to 12 TAs and over 200 students**.
- Currently **supervising projects** on researching improvements to **Knowledge Distillation** and **Domain Generalization**, leveraging principles from Adversarial Training and Gradient Harmonization.

### NLP Research Fellow

Sep. 2024 – Present

*Fatima Fellowship*

- Collaborated with undergraduate and graduate students around the world to investigate Multilingual Redteaming and **Safety Alignment for LLMs**.
- Generated synthetic data to **finetune Encoder BERT-like models** for **safety classification** on prompts, evaluating against existing Llama-Guard models in the context of misinformation detection.
- Implemented **inference pipelines for multilingual LLMs**, analyzing rates of compliance with potentially hazardous prompts and linking with retrieval mechanisms to study safety alignment.
- Manually **scraped and cleaned** tweets to curate a dataset related to culturally specific entities to evaluate how culturally-sensitive model completions were in filling masked prompts.

### Research Intern - Machine Learning

Jan. 2025 – Present

*Tibbling AI*

- Designing and implementing a **Keyframe Extraction** and **Keypoint Tracking** system for lab research animal videofeeds.
- Employed **Image Segmentation** models and **Unsupervised Clustering** algorithms to create an innovative mechanism for extracting representative frames from video.

### Machine Learning Engineer

May 2023 – Sep 2023

*ISSM.ai*

- Designed and implemented a robust pipeline integrating **OCR and QR code detection** for accurate invoice number extraction from diverse receipt formats.
- Comprehensively studied and rewrote the [docTR](#) repository in **PyTorch** to **train custom Text Detection and Recognition models** on a proprietary dataset of over 15,000 annotated images, enhancing system adaptability.
- Achieved a **5x reduction in latency** by optimizing final models for Intel CPUs using [ONNX and OpenVINO], delivering processing speeds of 350ms per image without sacrificing output quality.

### Deep Learning Intern

June 2022 – March 2023

*CodeSlash*

- Developed an **Object Tracking system** leveraging **YOLO** and StrongSORT to monitor and track cattle in **satellite imagery**, achieving a notable mean Average Precision (mAP) of 0.542.
- Optimized a **Face Recognition system** for CPUs using **OpenVINO, MongoDB, FastAPI, and Docker**, leading to a **3x improvement in latency** over the original implementation.

## EDUCATION

### Lahore University of Management Sciences

*BS in Computer Science, CGPA: 3.82, SCGPA: 3.94 (High Distinction)*

Lahore, Pakistan

*Aug. 2020 – May 2024*

## SKILLS

**Programming Languages and Developer Tools:** Python, C, C++, Linux, Excel, Docker, Git

**Machine Learning:** PyTorch, TensorFlow, JAX, Keras, Transformers, LangChain

**Web:** HTML/CSS/JavaScript, React, Node.js, MongoDB, Express, FastAPI, MySQL