Syed Waleed Hyder

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Education

- **Wichita State University (WSU)** — Wichita, Kansas
  Master of Science in Computer Science; — *Jan 2025 – Present*
- **National University of Sciences and Technology (NUST)** — Islamabad, Pakistan
  Bachelor of Engineering in Software Engineering; GPA: 3.67; Percentage: 91% — *Sep 2016 – May 2020*

Experience

- **Rapidev AI** — Remote
  Machine Learning Engineer — *Sep 2023 - Dec 2024*
  - **Few-shot User Intent Classification**: Developed and deployed multi-label user intent classifier for a debt collection product using few-shot learning techniques. Compiled DSPy program using GPT-4 as LLM (F1 score 0.85). Fine-tuned a RoBERTa model with SetFit, (F1-score 0.87). Utilized cross-validation to select optimal training samples. Successfully deployed both the model on an EC2 instance with Streamlit dashboard.
  - **RAG-based chatbot**: Leveraged Retrieval-Augmented Generation (RAG) with Haystack and Langchain frameworks to develop chat agents that have memory capabilities. Indexed documents using ColBERT and FAISS (with OpenAI ada embeddings) for efficient and contextually relevant retrieval.
  - **Advanced Content Optimization**: Implemented a hybrid strategy using Large Language Models and DSPy framework to generate SEO-enhanced content. Using analytics tools inLinks and Semrush for real-time semantic analysis and term ranking, boosting content visibility and search engine performance.
- **Retrocausal** — Redmond, Washington (Remote)
  Research Engineer — *Jul 2022 - Sep 2023*
  - **Retroactivity — Video Understanding module**: Worked on supervised and unsupervised fine-grained human activity segmentation at video and dataset levels using both frames and skeletons (pose information).

    Implemented algorithm for unsupervised action segmentation by detecting action boundaries which was deployed on iPad version of Retroactivity.
- **OMNO AI** — Lahore, Pakistan
  Machine Learning Engineer — *Sep 2021 - Jul 2022*
  - **SportsEye: AI-powered Football Analytics Platform**: Utilized broadcast streams for player and ball tracking, eliminating extra hardware needs. Implemented Player and Ball Detection using Single Stage Detectors, player tracking and re-identification with Deep Sort. Developed Broadcast view classification with custom CNNs, Field Line Masking using Pix2Pix GANs, Camera Pose Estimation via classical Homography, and Timer Localization using EAST detector with OCR methods.
  - **Adlytic: Audience Analytics Platform for Retail Stores**: Developed a pipeline for footfall counting, age and gender classification, area-wise heatmap generation, and dwell time analysis. Created APIs for KPI dashboard integration. Deployed the system using Docker in over 50 retail stores, achieving above 90% accuracy using YOLOv5, DeepSORT, and BYTETrack.
- **Systems Limited** — Karachi, Pakistan
  Machine Learning Consultant — *Aug 2020 – Aug 2021*
  - **Regeneron Pharmaceuticals: Data Analysis of Patient Wearable Devices**: Conducted gait analysis using ML algorithms on time-series data from Moticon sensors. Classified human activity based on accelerometer data from the Actigraph device using ML techniques. Tools: PySpark, AWS Redshift
- **SiPEO, Technical University of Munich** — Munich, Germany
  Research Intern — *Summer 2019*
  - **Slum Mapping in Satellite Imagery Using Deep Learning**: Collected and filtered image data on slums in Karachi and Islamabad. Utilized Fully Convolutional Networks (FCN) for segmenting slums from non-slums. Addressed class imbalance using specialized loss functions. Implemented transfer learning and adversarial domain adaptation to align embeddings of Karachi and Mumbai slum datasets.

- **IOPTIME** Islamabad, Pakistan
  Machine Learning Engineer *Jun 2020 – Jul 2020*
  - **NailsRoom. Nails Segmentation in human hands using deep learning**: Improved the mean IOU score by 100% using the existing data of nails. Increased the speed of the model on Android from 10 FPS to 25 FPS. Used the modified U-Net to segment the nails from hands. Used loss functions to characterize the class imbalance since the foreground pixels were dominant.

Publication

- **Action Segmentation Using 2D Skeleton Heatmaps (ICRA 2024)**: Developed a novel 2D skeleton-based action segmentation method using 2D skeleton heatmaps and Temporal Convolutional Networks, achieving comparable or superior results and robustness in fine-grained human activity recognition. This work is the first to utilize 2D skeleton heatmap inputs and explore 2D skeleton+RGB fusion for action segmentation.

Undergrad Thesis

- **Slum mapping in satellite imagery using deep learning**: I collected a novel dataset for semantic segmentation of slums in metropolitan cities of Pakistan (Karachi, Islamabad). Since the slum covered a relatively little area in the obtained imagery, vanilla semantic segmentation architectures were not giving the expected results due to imbalanced pixel distribution in the slum dataset. To characterize this imbalanced pixel distribution, I started out working on distributions with a focus on experimenting with loss functions including cross-entropy loss (weighted, balanced), Focal loss, Dice loss, and different combinations of these. Furthermore, for robust feature representation learning, images of the same patch at different wavelengths and resolutions from the satellite were stacked together to form a datacube. In addition to this, I used transfer learning and adversarial domain adaptation to align the embeddings of the Karachi and Mumbai slum dataset which was already available.

Skills

- **Libraries/APIs**: PyTorch, TensorFlow, Pandas, Natural Language Toolkit (NLTK), SpaCy, Google Vision API, Amazon Rekognition, Keras, OpenCV, PySpark, Langchain, Haystack, Tensorflow
- **Research**: Hypothesis formulation, EDA, experimental design, comparative model evaluation and benchmarking, fine-tuning pre-trained models, transfer learning, domain adaptation, academic writing, results visualization
- **Others**: Artificial Intelligence (AI), Natural Language Processing (NLP), Deep Learning, Recurrent Neural Net- works (RNN), Convolutional Neural Networks (CNN) Generative Pre-trained Transformers (GPT), Machine Learning Operations (MLOps), Deployment, GPU Computing, Algorithms, Recommendation Systems, Big Data, Chatbots, OCR (Optical Character Recognition), Python, Serverless, APIs, Training, Modeling, Time Series Analysis, Transformer Models, Generative AI, Databases, Cloud, Software Architecture, Data, AI Integration, LangChain, Prompt Engineering, Action Recognition, Text to Speech (TTS), Speech to Text, Object Detection, Semantic Segmentation, LLM Text to Text Generation, Conversational Agent