Mohtashim Butt

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Education

Lahore University of Management Sciences – BS Computer Sciences — Lahore, Pakistan
Relevant Courses: Computer Vision, Introduction to Artificial Intelligence, Machine Learning, Speech and Language Processing with Generative AI, Deep Learning, Differential Calculus — *Aug. 2020 – May 2024*

Experience

Undergraduate Research Assistant — **Centre for Urban Informatics, Technology, and Policy**
Developed a model for greenspace segmentation in satellite imagery — *Aug. 2023 – Ongoing*

- Collected satellite imagery from GEID, annotated greenspaces (Trees, Crops, Grassland, etc.) on them via LabelMe, and hosted the dataset on Roboflow.
- Fine-tuned Yolov8 instance segmentation model and trained it for greenspace segmentation on satellite imagery.
- Automated stitching process of segmented image and overlayed NDVI as a post-processing technique. | Paper

Technical Content Intern — **Educative Inc.**
Area: Research and Development in Machine Learning — *June. 2023 – Sept. 2023*

- Conducted extensive research about computer vision, computer graphics, and machine learning topics and curated around **58** quality articles.
- Set up docker containers for OpenCV python code, VPython, d3.js, Octave, and React to deploy the applications within Educative's online widget. | My profile.

ML Research Intern — **Centre for Water Informatics and Technology**
Engineered a low-cost multi-camera module for forest fire detection — *May. 2023 – June. 2023*

- Integrated four ESP-32 camera modules to develop a low-cost single unit for capturing a multi-directional (360°) view.
- Wrote scripts (in PHP and Python) to automate the process of sending captured images from assembled ESP-32 cameras to a self-hosted site and retrieving them to the local PC.
- Fine-tuned a tiny-Yolov5 model for forest fire detection in the retrieved images to trigger an alarm. | Final Report

Projects

Semantic Segmentation of Ancient Text and Carving on Petroglyphs — Directed Research Project
Supervisor: Dr. Murtaza Taj (Ph.D. Queen Mary University of London) — *Sept. 2023 – Ongoing*

- Generated a rich dataset bank by cropping, annotating, pre-processing, and augmenting ancient South Asian rock art images and automated the entire process.
- Scrutinized pre-existing vision and language models like CLIP and Dall-E to leverage the prompt-based explanation of the segmented carvings on the rocks.

Emotionally Intelligent Therapist Chatbot for adults — Generative AI Task
Supervisor: Dr. Agha Ali Raza (Ph.D. Carnegie Mellon University) — *Feb. 2023*

- Employed Regular Expressions (RegEx) for precise input parsing and structured responses.
- Developed a Naïve Bayes classifier from scratch and integrated it into the bot, enabling it to respond to the input prompts in accordance with the expressed emotions.
- Hosted the chatbot on the web using Flask and planning for deployment in Heroku | Source Code.

Similarity Detection and Sentiment Analysis of Online Text — Machine Learning Project
Supervisor: Dr. Agha Ali Raza (Ph.D. Carnegie Mellon University) — *Nov. 2023 – Dec. 2023*

- Fine tuned sentence transformer (SBERT) for text embedding generation and designed the pipeline for text similarity detection and sentiment analysis.
- Analyzed the sentiments (using Naïve Bayes classifier) and similarity (using Logistic Regression classifier) of the Quora question pair dataset and evaluated the model's performance. | Source Code.

Lane Segmentation Model for Autonomous Cars — Computer Vision Project
An algorithm to detect lanes for autonomous cars for traffic safety — *Nov. 2022 – Jan. 2023*

- Designed an algorithm for a car to automatically segment lanes (using LaneNet architecture) and detect vehicles on the road (using the Yolov7 model), which will assist the car in autopilot.
- Developed a dynamic homography mechanism to display a real-time orthographic top-view of the Lane | Source Code

Teaching Experience

Teaching Assistant — Computer Vision Fundamentals (CS-5310)
Instructor: Dr. Murtaza Taj — *Fall-2023*

- Made programming assignments on CNNs, image feature processing, camera models, and SFM for **70+** students.
- Led several sprints in the final project on real-world to satellite view mapping.
- Revamped the course structure by incorporating Hugging Face and Roboflow use.

Skills

- **Languages:** C, C++, Python, MATLAB, TypeScript, JavaScript, HTML, CSS, Haskell, Arduino .
- **Libraries, Tools & Frameworks:** TensorFlow, PyTorch, numpy, scikit-learn, pandas, keras, OpenCV, matplotlib, NLTK, LLM, Cuda, ViT, Git, Docker, MLOps, Flask, Heroku, SQL and no-SQL database, Proteus.