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, Language Processing with Generative AI, Deep Learning, Probability and statistics *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*

- Curated a remote sensing dataset using GEID, annotated greenspaces (Trees, Crops, Grassland, etc.) using LabelMe, preprocessed the dataset, and hosted it on Roboflow.
- Fine-tuned Yolov8 instance segmentation model and trained it for greenspace segmentation on the prepared dataset.
- Automated stitching process of segmented images 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, data science, and machine learning topics and curated around **58** technical articles in each area.
- Set up docker containers for OpenCV/Matplotlib python code, VPython, d3.js, Octave, and React to deploy the applications within Educative's online widget. | My profile.

Machine Learning 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 **CNNs, ViTs, OpenCV, LabelMe**

- Generated a rich dataset bank by cropping, annotating, pre-processing, and augmenting ancient South Asian rock art images and automated the entire process using Python scripting.
- 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.

Lane Segmentation Model for Road Safety **Yolo, OpenCV, LaneNet, Keras, Vehicle Detection**

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

ML Modeling from Scratch for Classification/Regression/Reconstruction **Librosa, Gradiao, TensorFlow**

- Implemented PCA and Autoencoders on MNIST, STL-10, and CIFAR-10 dataset for image reconstruction and denoising | Code
- Generated mfcc features from AudioMNIST dataset and trained a neural network for multi-class classification. | Code
- Engineered an RNN for new-born baby name generation (character-level sequence modeling) | Code
- Optimized k-nearest neighbors algorithm using k-fold cross-validation technique on STL-10 dataset. | Code

ML Model Deployment **Flask, Heroku, CI/CD Pipeline, AWS, HTML**

- Implemented a linear regression model using the gradient descent algorithm (using graduate admission dataset with careful feature selection) to predict the likelihood of admission to graduate school. | Code
- Developed an emotionally intelligent therapist chatbot using RegEx and Naïve Bayes classifier. | Code
- Deployed the aforementioned projects on the web using Python Flask and hosted them on Heroku.

Knowledge Dissemination Analysis in IVRs **SQL, Apache, PHP, HTML, Relational Database**

- Investigated Sawaal's database via carefully engineered SQL queries to determine the users' knowledge retention, engagement, and the kind of content they post.
- Determined the penetration magnitude of IVRs among Pakistan's low-literate and low-income population, hosted our analysis locally using PHP scripts, and proposed a solution of disseminating information via short stories. | Report

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 the project on real-world to satellite view mapping and introduced Hugging Face and Roboflow to the curriculum.

Languages & Frameworks

- C, C++, Python, MATLAB, TypeScript, JavaScript, HTML, CSS, Haskell, Arduino, NLTK, scikit-learn, Matplotlib, Cuda, Git, Docker, Kaggle, Hugging Face, Roboflow, SQL and no-SQL database, Proteus.