MAHNOOR FATIMA SAAD

✉ mahnoorfatimasaad24@gmail.com 📞 (+92) 323-5544724 ⓞ mahnoor-fatima-saad 🔗 mahnoorfatimasaad

EDUCATION

COMSATS University Islamabad   *Islamabad, Pakistan*
Bachelor of Science in Software Engineering   *Sept 2017 - Aug 2021*
CGPA: 3.77
RANK: 4th in Software Engineering Class of 2021
Honors: Received Government Merit Scholarship for ranking top 5 in Software Engineering class of '21 1st, 3rd and 4th years
Courses: Artificial Intelligence, Machine Learning, Introduction to Data Science, Data Warehousing and Data Mining, Data Structures and Algorithms, Database Systems, Data Communications and Networks

WORK EXPERIENCE

PhotoGAUGE Inc./ Konstant Variables   *Dec 2021 - present*
Machine Learning Engineer

- Single and multiple **2D image-based 3D mesh reconstruction** of various doors and windows to replace human involvement for measurements and fittings

  - **Re-implemented TARS - Topologically-Aware Deformation Fields for Single-View 3D Reconstruction** on the **custom 3D synthetic datasets** including masks, camera poses, point clouds and meshes for required categories of doors and windows

  - Trained the first Multilayer Perceptron (MLP) to predict the **Signed Distance Field (SDF)** for each 3D point in the dataset followed by **training for Image-Encoder, SDF Perceptron and Renderer** to extract the embedding in a single image and render it with camera poses and masks onto a 3D categorical field to create canonical spaces for each class in our datasets

  - Trained the **DeformNet Perceptron** to convert each 3D point from the object space to the **canonical space** with equal distance mapping and output the resultant mesh rendering

  - Performance was in the low **70th percentile** but proved to have a accurate reconstructed object from our dataset and in-the-wild images of topologically diverse doors and windows

- Implemented a **Voxel-Based rendering** approach for 3D Reconstruction of objects including tyres, windows and engine parts

  - Modified the basic **Pix2Vox: Context-aware 3D Reconstruction from Single and Multi-view Images** structure by altering the **Encoder and Decoder** to adapt to our prepared datasets, streaming resultant mesh output into the base **Context-Aware Fusion Module** and finally refining the output with the Refiner module for a **voxel-based reconstruction** of tyres and engine parts

  - **Fine-tuned the pre-trained Pix2Vox-A model** by freezing the initial layers of the network and resuming training with single view images for 250 epochs followed by 100 epochs with multi-view images for our datasets

  - IoU accuracy for n-view reconstruction for the Pix2Vox-A model are shown to be in range 0.6-0.7, the results on our datasets did not perform well with an IoU ranging from 0.3-0.5

- Designed, trained and deployed a custom **Style Generative Adversarial Network (StyleGAN)** followed by a 3D reconstruction module to build **Metaverse integratable, personalized avatars and NFTs using single selfies or multi-view 2D images**

  - Utilized **exemplar-based portrait style transfer** proposed in **Pastiche Master: Exemplar-Based High-Resolution Portrait Style Transfer** by training it on in-house **Lego-like image dataset**

- – Modified the framework to adapt to full 360° human busts (instead of the simple human face implementation) for 3D reconstruction by using the pretrained FFHQ StyleGAN model, reshaped and froze the final layers of the network and fine-tuned it on our dataset
  - – Piped the output of this styleGAN module to the 3D reconstruction module formulated by re-implementing **PIFu: Pixel-Aligned Implicit Function for High-Resolution Clothed Human** in order to create a 3D reconstruction from multiple images
  - – Obtained decent metaverse-friendly human avatars from our stylized images and deployed this system for clientele testing
- Utilized **Facebook AI's Detectron2** framework to train and deploy **custom Key Point Detection and Object Segmentation** on our doors and windows datasets
  - – Created and labeled **COCO-formatted keypoints** for multiple categories of windows and doors based on client's requirements
  - – Adapted Detectron2 framework to AWS SageMaker and trained on the datasets with a high accuracy of the 90th percentile for multiple key-point detection detection and measurements
  - – Converted our trained models with **D2Go** - the mobile friendly version of Detectron2 - for fast, **real-time detection** of required key points and deployed it in the application for field testing

Pakistan Telecommunication Company Ltd. *Sep 2021 - Dec 2021*
Assistant Manager Data Science and Analytics
- Generating **Business Intelligence Ad Hoc data reports** for PTCL internal and external teams, Ufone Customer Engagement Campaigns and Etisilat International Group for UAE and Pakistan
- Using Teradata Vantage to extract, analyze and plot key performance indicators for **deep dive analytics** and customer engagement analysis used in country wide campaigns
- Designing, Training and Deploying analytical machine learning models using **traditional regression methodology** on different variables to **predict end user engagement** based on current network data
- Spearheaded successful campaigns for customer engagement on the basis of trained model predictions

PROJECTS

Automated Eye Diagnostic System *Senior Project*
Machine Learning based Android Application
- Designed, trained and deployed multiple end-to-end machine learning models for a**utomated eye ailment diagnosis with phone-camera input images**
- **Collected, cleaned and pre-processed pictorial data** from Pakistan's famous Al-Shifa Eye Hospital for a multitude of ailments including classes of diseases, infections and physical deformities of the eye
- Because of the lack of data, used **transfer learning** by employing **pre-trained VGG16 and ResNet50** base structures fitted atop with **custom convolution, pooling and flattening layers**
- Validated our custom-architecture models with test data resulting in accuracy peaking at **85-90%** for all 4 models for infections, disorders, diseases and fundus scans.
- Independent server was integrated with an **in-house Flutter based android application** which allowed users to capture **real-time images** of their eyes and have a fairly **accurate diagnoses** on the image by inferring on our pre-trained models

Deep Learning Specialization *DeepLearning.AI Coursera*
- Successfully completed the five courses by Andrew Ng within the specialization
- Sequentially implemented a series of various machine learning algorithms via different use cases
- Learned to implement Linear and Logistic Regression, CNNs, RNNs, GANs, LSTMs, NLPs Word Embedding Algorithms, Transformer Networks, Transfer Learning, Image Segmentation, Detection Algorithms and hyperparameter definition and tuning throughout the duration of the specialization

SKILLS

Languages: Proficient in Python, SQL, Java, Experience with: C/C++, JavaScript
Frameworks: TensorFlow, Keras, NumPy, SciKit-Learn, Matplotlib
Algorithms: CNNs, Clustering, Regression, Decision Trees, SVM, GANs, RNNs
Tools: AWS Sagemaker, AWS EC2/ECR, Docker, Kubernetes, Teradata Vantage, Anaconda, Jupyter