AMOGH MANOJ JOSHI

✉ ajoshi83@asu.edu ● amoghjoshi.netlify.app in amogh-joshi ⌂ github.com/AmoghJ001

Education

Arizona State University **Fall 2022 - present**
Master's in Computer Science (MS CS)

University of Mumbai **July 2018 - June 2022**
Bachelor of Engineering - Electronics and Telecommunication *CGPA: 8.85/10*
Relevant Coursework:
- Database Management System
- Neural Networks and Fuzzy Logic
- Image Processing and Machine Vision
- Structured Programming Approach
- Object Oriented Programming
- Data Compression and Encryption

Publications

Research Interests: Computer Vision, Deep Learning, Data Science

1. **GDenseMNet: Global Dense Multiscale Feature Learning Network for Efficient COVID-19 Detection in CT Images**
   2022 International Joint Conference on Neural Networks (IJCNN) (Accepted for oral presentation!)
   Amogh Manoj Joshi, Deepak Ranjan Nayak

2. **MFL-Net: A Lightweight Multi-Scale Feature Learning CNN for COVID-19 Diagnosis from CT Images**
   IEEE Journal of Biomedical and Health Informatics (2022) (IF:7.021) ⌂
   Amogh Manoj Joshi, Deepak Ranjan Nayak

3. **LiMS-Net: A Lightweight Multi-Scale CNN for COVID-19 Detection from Chest CT Scans**
   ACM Transactions on Management Information Systems (2022)
   Amogh Manoj Joshi, Deepak Ranjan Nayak, Dibyasundar Das and Yu-Dong Zhang

4. **A Machine Learning Based Bike Recommendation System Catering To User's Travel Needs**
   17th IEEE India Council International Conference (INDICON) 2020 ⊕
   Ananta Kumar Das, Amogh Manoj Joshi and Subhasish Dhal

5. **Deep Learning Based Approach For Malaria Detection in Blood Cell Images**
   2020 IEEE Region 10 International Conference (TENCON 2020) ⊕
   Amogh Manoj Joshi, Ananta Kumar Das and Subhasish Dhal

Experience

Malaviya National Institute of Technology Jaipur **May 2020 – May 2022**
Research Assistant: Deep Learning, Computer Vision *Jaipur, India*
- Worked on developing lightweight Deep Neural Networks (DNNs) with a focus on Multi-scale feature learning for COVID-19 Detection from Chest CT Scans. Proposed and published three models at top conferences and journals.
- Developed MFL-Net: an extremely lightweight architecture (0.78M Params) with Multiscale Feature Learning (MFL) modules capturing and preserving features at different depths with a blend of convolutions and residual connections.
- MFL-Net (30x lighter than ResNet-50 and 9x lighter than DenseNet-121) achieved an accuracy of 98.79% and 93.59% on SARS-CoV-2 CT-Scan dataset and COVID-CT dataset respectively.

Microsoft Research (MSR) Redmond **Sept 2021 – Jan 2022**
Intern at Interactive Media Group: Computer Vision *Redmond, WA*
- Worked on understanding why Convolutional Neural Networks (CNNs) fail to generalize on images with varying intensities of adversarial perturbations like Gaussian Noise, Background Occlusion and Affine Transformations.
- Performed experiments on the benchmark ILSVRC Dataset using pretrained Imagenet models like AlexNet, VGG-16, EfficientNet using Pytorch. Visualized saliency maps using GradCAMs to highlight the model's attention region in the image, giving insights behind the wrong prediction.
- Analyzed of the dip in classification performance with the increasing intensity of different perturbations for all the ImageNet models using Matplotlib and Python.

Indian Institute of Technology Ropar **Nov 2020 – June 2021**
Research Intern: Deep Learning *Punjab, India*
- Worked on COVID-19 Lung Lesion Segmentation on the official NIH COVID-19 Grand Challenge Data. Analyzed the segmentation performance of U-Net and its variants like R2UNet, Attention UNet etc.
- Experimented modifying these networks by adding residual blocks and atrous convolution blocks in their architectures.
- Added attention mechanism in UNet coupled with Tversky Loss function for enhancing feature learning capability which gave the best segmentation IoU of 93.47%

Indian Institute of Information Technology Guwahati   **May 2020 – Aug 2020**
Data Science Intern   *Guwahati, India*

- Worked on developing a bike recommendation system for public bike sharing systems around the globe. Analyzed millions of trip records from the official Divvy Bike dataset.
- Grouped bikes with similar trip patterns including trip distance and trip duration using K-means clustering into three categories: highly used, moderately used and rarely used bikes.
- Trained a Random Forest Classifier to predict the best cluster of bikes depending on the user's desired trip duration and trip distance. The model achieved an accuracy of 97%

Projects

Passenger Detection in Bus Transport Service | *Keras, YOLOv5, Raspberry Pi, Google Firebase*   **Sept 2021**
- Developed a fully automated passenger count detection system which captures an aerial view inside the bus using a camera connected to Raspberry Pi.
- Captured and curated a novel dataset containing aerial view images inside the bus. The captured image is processed using Region of Interest (ROI) cropping to focus on the seats and corridor.
- Trained a YOLOv5 object detection model to detect number of passengers inside the bus. Also developed an algorithm to count the number of empty seats depending on the bus model.
- The system updates the passenger count, empty seats and current location of the bus to Firebase which can be accessed via a website and an App.

Face Mesh Detection along with Emotion Recognition | *Keras, Mediapipe*   **June 2021**
- Built a live face mesh detection system using Mediapipe library with an added emotion recognition feature.
- Trained ResNet-50 on the Extended Cohn-Kanade(CK+) emotion recognition dataset and fused it in the mesh detection pipeline.
- This project aims to help corporations and institutes for employee recognition along with understanding their mental state at work.

MedDES: The Medical Diagnostic Expert System | *Keras, Streamlit, Heroku* 🌐 🐙   **Jan 2021**
- Developed a diagnostic system for medical image diagnosis using deep learning which has four diagnostic tests for Malaria, COVID-19, Pneumonia and Brain Tumour. The system also generates a detailed patient report.
- Built and trained four lightweight CNN models using Keras, one for each diagnostic test. The models are deployed in the system and have an average inference time of 84 milliseconds.
- For enabling easy access, system was built as a web application using Streamlit and deployed using herokuapp.

Accident Avoidance Alert System For Drivers | *Keras, Arduino UNO, HC-12 Module*   **Mar 2020**
- Developed an object detection system that detects road signs, vehicles and pedestrians using a trained YOLOv3 and notifies it to the driver by giving a count of objects detected.
- Built and trained four lightweight CNN models using Keras, one for each diagnostic test. The models are deployed in the system and have an average inference time of 84 milliseconds.
- For enabling easy access, system was built as a web application using Streamlit and deployed using herokuapp.

Technical Skills

Languages	- Python, C++, Java, HTML, SQL
Machine Learning	- Keras, TensorFlow, PyTorch, MONAI, Mediapipe, Streamlit
Python Libraries	- OpenCV, ImageIO, Scikit-learn, Scikit-image, Pillow, Numpy, Pandas
Software	- MATLAB, Tableau, Jupyter Lab, Pycharm, VS Code

Awards and Recognition

- Selected for the **5th Summer School on Artificial Intelligence: 2021** organized by   [2021]
  International Institute of Information Technology Hyderabad from Aug 2 - Aug 31

- Selected for **Eastern European Machine Learning (EEML) Summer School 2021**   [2021]
  amongst a competitive international pool of 1000+ applicants

- Selected as one of the six **Student Mentors** in my department. Responsibilities include   [2021]
  mentoring junior students academically and providing guidance about their career prospects

- 3rd Prize in IEEE Technical Paper Presentation Competition 2020 held in my institute for my   [2020]
  research work titled **"Accident Avoidance Alert System for Drivers"**

- Ranked among the top 60 teams amongst 1913 participating teams in E-yantra's **Hackathon**   [2020]
  2020: Fighting COVID-19 for our proposed solution: **COVID-19 App**