Ashwin Sateesh Kumar

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EDUCATION

Northeastern University Boston, MA | December 2023

Master of Science in Data Science ***(GPA: 3.8/4)***

- ***Courses:*** *Machine Learning, Data Mining, Algorithms, Database Management Systems, Deep Learning*

PES Institute of Technology Bengaluru, India | July 2019

Bachelor of Engineering in Electronics and Communications ***(GPA: 8/10)***

- ***Courses:*** *Linear Algebra, Artificial Neural Networks, Pattern Recognition, Image Processing, Signal Processing*

TECHNICAL SKILLS

- **Programming Languages**: Python, R, MATLAB, SQL (SQLite, MySQL, NoSQL), Java, HTML, PHP
- **Frameworks and Libraries:** Scikit-Learn, TensorFlow, Keras, PyTorch, OpenCV, Pandas, NumPy, Matplotlib, NLTK, tidyverse
- **Tools & Technologies:** Jupyter, RStudio, Git, Tableau, SPSS, MS Excel, Spark, Hadoop, Hive,Docker, MongoDB, AWS (Sagemaker), GCP
- **Skills:** Statistical Analysis, Data Analysis, Visualization, Optimization, NLP, Computer Vision, Agile (Scrum, Jira, Confluence)
- **Certifications:** Deep Learning Specialization, AI Engineer Master's Program, Generative AI with LLMs

WORK EXPERIENCE

Research Assistant - *Khoury College of Computer Sciences* Boston, MA | July 2023 – November 2023

- Led the development of a **multi-modal variational autoencoders (VAE)** with convnets, transformers and **LLMs (BERT, GPT2**) effectively **capturing complex image-text relationships** in political social media (Instagram) data with 400,000 records
- Facilitated **disentangled representation learning** and **discovered generative factors**, **enabling controlled robust image and text reconstruction** and provided a nuanced understanding of political narratives as portrayed through social media imagery
- Deployed the model on GCP, achieving remarkable **generative capabilities and generating results in images from text and vice versa**. Utilized **quantization techniques, resulting in a 30% boost in processing** and **enhancing multi-modal data analysis workflows**

Machine Learning Research and Development Intern - *Signify Research (Phillips Lighting*) Boston, MA | June 2022 – December 2022

- Designed and integrated an **AR-based system** in Unity 3D, utilizing REST-API calls to activate dynamic shows on Phillips lighting devices, **enhancing user interaction**
- Enhanced **household lighting scenes of** 18 homes and **plant growth strategies** of medical cannabis cultivars with optimal lighting strategies using **SARIMAX and Xgboost forecasting models**, achieving 97 percent accuracy
- Demonstrated the potential of **personalized lighting in smart homes** to stakeholders by Implementing **User Re-Identification proof of concept** using omniscale feature learning, achieving a mean average precision (mAP) of 0.95

Graduate Teaching Assistant - *Khoury College of Computer Sciences* Boston, MA | September 2021 – April 2022

- Collaborated with faculty to develop coursework and conducted office hours for over 90 graduate students in Machine Learning (CS6140 and DA5030), including comprehensive assessment of quizzes and assignments

Trainee Automotive Software Engineer - *KPIT Technologies Ltd* Bengaluru, India | July 2019 – November 2020

- Developed a custom **U-Net-based semantic segmentation** model for **precise spatial detections in traffic scenes** with 0.89 IoU
- Improved annotation of 1 million images for a BMW Autonomous vehicle's model using **Transfer Learning and HIL** methods
- Devised an object detection prototype of **Vision and Radar Sensor Fusion** for Advanced Driver Assistance System and deployed the model design in Simulink

PROJECTS

HealthBot: Intelligent Healthcare Assistant using LLMs December 2023

- Boosted chatbot's **disease classification capability** to 96 percent accuracy using **Bi-RNNs and GloVe** embeddings, **retrieved relevant medical information** from a knowledge graph by **detecting entities through fine-tuned BERT** with a F1 score of 0.84
- **Enhanced GPT-2 performance** via **fine-tuning, utilizing engineered prompts** aligned with detected medical entities, yielding accurate responses with an **semantic similarity score of 0.78**, and **improved contextual understanding** using **reinforcement learning (RLHF)**

Bank Management System December 2023

- Developed an end-to-end Bank Management System with **user-friendly interface modules** for customer account management, transaction processing, balance inquiries, loan applications, and reporting
- Engineered **robust backend in PHP** featuring authentication, business logic processing, **database integration with MySQL**, and modules to handle core banking functions like deposits, withdrawals, and transfers

Video Speech Detection and Caption Generation April 2023

- Orchestrated **end-to-end processing pipeline** for MIRACL-VCI dataset: face detection, lip region extraction (Haar cascade), **feature extraction (RESNET50/VGG16)**, and sequential modelling with **attention-based LSTM and Transformers**
- Successfully implemented a **lip reading and the caption generation system** utilizing the developed pipeline to achieve classification and **text generation for words and phrases in the video** frame with 91.3 percent accuracy

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Pet Classification and Face Recognition Model April 2022

- Constructed custom convolutional neural nets with VGGNet based architecture for classification of cats and dogs, and **built a custom face detection model** by applying bounding box augmentation to **detect cats and dogs in real time** with the help of YOLOv5

Time Series Analysis of Favorita Stores December 2021

- Performed in **depth analysis on 3 million sales records to identify seasonality and trends** through decomposition techniques, effectively removing the stationarity
- **Optimized the wastage and operating costs** by forecasting sales and demand using SARIMAX and machine learning models

Amazon E-commerce Modelling and Recommender System September 2021

- Performed Sentiment analysis of Amazon customer reviews. **Found main topics** of the reviews using **Latent Dirichlet Allocator (LDA**), and reviewed text to build a **product recommender system** using **collaborative filtering**
- Utilized **Word2Vec for word embeddings** and built a **LSTM model to predict the sentiments** of reviews and boosted the performance to 95 percent accuracy

Detection of Copy Move Forgery May 2019

- Developed a **method that automatically detects duplicate regions in an image** and identified the key points and descriptors of MICC-F220 images **using Scale-Invariant Feature Transform (SIFT)**
- Classified the images as tampered and original with a dense neural network with an accuracy of 94 percent