Aviral Joshi

About Me | LinkedIn | GitHub | Kaggle

Education

Carnegie Mellon University - School of Computer Science Pittsburgh, PA
Master of Computational Data Science | QPA: 3.56 December 2020
Coursework: Machine Learning, Deep Learning, Data Visualization, Neural Networks for NLP, Advanced Multimodal Machine Learning, Multilingual NLP, Deep Reinforcement Learning, Cloud Computing & Quantum Computing

PES University - Computer Science Department Bangalore, India
Bachelor of Technology in Computer Science and Engineering | GPA: 8.86 / 10 June 2019
Coursework: Machine Learning, Advanced Algorithms, Image Processing, Data Analytics, NLP, Probability & Statistics

- Secured First Class with Distinction with Specialization in Data Science

Skills

Programming: Proficient: Python, C; Experience With: Java, C++, R, JavaScript
Databases: Experience with MySQL & MongoDB
Machine Learning: PyTorch, TensorFlow, Scikit-Learn
Data Analysis and Processing: Pandas, Plotly, Tableau, Docker, Elastic MapReduce, ETL, OpenCV, NumPy, NLTK

Experience

Robotics Institute – Carnegie Mellon University Pittsburgh, PA
Research Assistant May 2020 - Present

- Working in collaboration with Northrop Grumman to formulate an approach for visual dialog-based navigation of an autonomous agent in urban search and rescue scenario constrained by limited bandwidth for communication
- Surveyed state-of-the-art approaches in Embodied Question Answering to design a solution tailor-made for the search and rescue scenario
- Designed a synthetic data generation pipeline in Python to gather over 10K annotated image, dialog pairs from for model training and prototyped a baseline visual dialog model in a simulated Minecraft environment

VMware Bangalore, India
Research and Development Intern January 2019 - June 2019

- Upgraded VMware's on-disk metadata analyzer to support Spanned and Grown Volumes on VMFS6 filesystem and built data structures for efficient in memory caching of filesystem metadata, improving runtime performance

VISIO.AI Bangalore, India
Cofounder, Artificial Intelligence Analyst May 2017 - July 2018

- Designed a Face Verification algorithm with a ResNet inspired architecture trained with triplet-loss to authenticate employees of a small business (under 50) and guaranteed less than 1% error rate in real-world setting
- Developed a License Plate Recognition system using YOLO object detection to operate in high traffic environments with end-to-end latency of under 100ms. Deployed the solution Chief Minister's office in Lucknow, India
- Patent pending on a method to monitor driver fatigue levels from facial cues using deep learning to suggest risk mitigation strategies while operating under computational constraints of a microcontroller (Raspberry pi)

National University of Singapore Singapore
Summer Intern June 2018 - July 2018

- Performed sentiment analysis using NLP and recurrent networks on YELP review corpus to rank businesses and compare them against similar businesses
- Surveyed Neural Network architectures to separate background music and voice from audio sources and Implemented a UNet like model to mask an input audio spectrogram and obtain singer's voice from songs

Center for Cloud Computing and Big Data – PES University Bangalore, India
Summer Intern May 2017 - July 2017

- Assessed satellite imagery collected from Google Maps to determine the green index of a geographical location utilizing Multi-Node Hadoop cluster to perform MapReduce for processing large images
- Designed the backend of an Automatic Video Annotation and playback application using Node.js and OpenCV to selectively edit out important events of a Cricket match for generating highlights

Projects

Language Generation from Structured Data Carnegie Mellon University | Spring 2020

- Developed a prototype-based language generation model using LSTM with Copy Attention mechanism to generate textual descriptions from Wikipedia info. boxes
- Efficiently calculated Jaccard similarity using locality sensitive hashing to select good prototypes and demonstrated empirical superiority over baseline-autoregressive models by improving the BLEU score by ~20 points

Semi-Supervised Subtomogram Classification (In review at WACV) Carnegie Mellon University | Spring 2020

- Developed a novel semi-supervised clustering approach to identify macro-molecular structures in 3D Cryo-ET images by incorporating a regularization term to learn K-Means friendly latent representations
- Outperformed state-of-the-art in accuracy on all datasets and achieved an improvement of over 3x in inference time

Unsupervised Scene change identification (Video) Carnegie Mellon University | Spring 2020

- Introduced a generative approach that uses a Beta-VAE to identify scenes changes in videos by measuring KL divergence between images
- Proposed approach eliminated manual effort in annotating data for downstream tasks such as Super-Slomo

Speech to Text for English Carnegie Mellon University | Spring 2020

- Designed a speech-to-text translation system using a Pyramidal Bi-LSTM + Attention architecture in PyTorch
- Improved BLEU by 10 points over baseline by adding Gumbel Noise, varying teacher forcing and using Beam Search

Quantum Support Vector Machine Carnegie Mellon University | Spring 2020

- Implemented the Quantum SVM algorithm with Quantum RAM by designing their circuits in qiskit and evaluated QSVM's performance on handcrafted datasets using quantum simulators and a 16 Qubit bare-metal system

Twitter Analytics Web Service Carnegie Mellon University | Fall 2019

- Performed ETL on over 1TB of raw twitter data using MapReduce to develop a user Recommendation system
- Architected a Web tier solution using Vert.x webserver in Java to achieve an RPS of over 61K, topping an internal leaderboard consisting of 35 teams
- Deployed a heterogenous backed with MySQL & HBase databases and optimized for read throughput

YouTube Trending Analytics (Website) Carnegie Mellon University | Fall 2020

- Investigated factors that govern the YouTube trending page and visualized the presence of user and platform bias
- Hypothesized the reasons for existence of bias and demonstrated their variability across different countries
- Constructed a Machine Learning pipeline with XGBoost classifier to predict the likelihood of a video to trend

Stance Detection to Identify Fake News (Video) (Report) PES University | Spring 2019

- Developed a Bi-LSTM model with state-of-the-art Contextualized word Embeddings ELMo, to detect discrepancies between claim present in a news article and other authoritative news sources to identify potential fake news
- Demonstrated the superiority of the approach over existing online APIs for stance detection

Unconstrained Face Recognition (Publication) PES University | Spring 2018

- Introduced a novel pipeline architecture for face recognition which used the highly optimized CloudForest algorithm to achieve 10-15x training time improvement over other ensemble classifiers such as Random Forest

Stock Market Dashboard PES University | Spring 2017

- Extracted real-time stock market data using google finance API and created a dashboard to display live information using a back-end Node.js server and an indexed MongoDB database for faster queries
- Performed Fourier analysis to analyze fluctuations in intraday stock prices of the National Stock Exchange to suggest buying or selling of stocks for profit maximization

Extracurriculars

- Member of the **Multimodal Machine Learning** reading group. Involved in weekly discussions on advancements in Multimodal Machine Learning and state-of-the-art models
- Participant in the **Social Computing** reading group which involves brainstorming over new publications in Machine Learning which analyze social biases present in deep learning models and datasets

Achievements and Awards

2018: My start-up VISIO.AI was listed amongst **"20 Most Promising AI Providers of India"** by C.I.O. review

2017: Received recognition from **news media** outlets for work done on **Driver Fatigue detection** system

2016: Won **2nd runners-up** at a Hackathon for developing an **automobile crash alert** detection Android application