Aviral Joshi

About Me | LinkedIn | GitHub | Kaggle

Education

Carnegie Mellon University - School of Computer Science Pittsburgh, PA
Master of Computational Data Science | QPA: 3.7 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: 8.8 / 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 Jun 2020 – Dec 2020

- Working towards integrating a Natural Language Understanding module within an autonomous agent to enable human assisted navigation along with the ability to describe observations in the environment
- Designed a synthetic data generation pipeline using Python to gather over thousands of image, question & answer pairs for model training and prototyped a baseline Visual Question Answering 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 & ML Engineer 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

Visual Question Answering from Image Sets Carnegie Mellon University | Fall 2020

- Developed an Adversarial Regularization technique to reduce dependance on language biases and improve performance on out-of-domain data while maintaining state-of-the-art performance on in-domain data
- Introduced a new pre-training objective which utilizes object bounding boxes extracted using an RCNN to improve model performance on object description questions by over 4%

Unsupervised Machine Translation Carnegie Mellon University | Fall 2020

- Implemented a Machine translation deep learning model using the Transformer architecture to translate languages from English and Russian to Low resource languages such as Belarusian and Azerbaijani
- Experimented with Backtranslation, Finetuning and Multilingual Translation to improve translation score

Language Generation from Structured Data Carnegie Mellon University | Spring 2020

- Developed a prototype-based language generation model using LSTM with 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 ~2 points

Semi-Supervised Subtomogram Classification 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

YouTube Trending Analytics (Website) Carnegie Mellon University | Fall 2019

- 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

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

Stance Detection to Identify Fake News (Video) 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

Extracurriculars

- Member of the **Multimodal Machine Learning** reading group; involved in discussions on advancements in state-of-the-art DL models
- Participant in the **Social Computing** reading group which involves analyzing the proclivity of deep learning models to capture social biases

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 using sensors present within Smart Phones