





Divya Appapogu

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My research interests lie in Computer Vision, Natural Language Processing and Vision Language Grounding with a focus on real-world applications.

Education



- Sept 2021 – Jan 2023  **M.S in Artificial Intelligence**, Boston University, **GPA: 3.93**
Directed Study: *Text-Guided Image Manipulation Detection*
- Aug 2015 – Aug 2019  **B.Tech in Engineering Science**, Indian Institute of Technology, Hyderabad.

Work Experience

-  **Barclays**, *Software Developer, BA4*. [Feb 2023 - Present]
-  **Boston University**, *Research Assistant*. [Jan 2022 - Jan 2023]
- **Text-Guided Image Manipulation Detection.** Working with Professor Bryan Plummer on demonstrating the effectiveness of a multi-modal approach in image manipulation detection through a series of experiments and comparisons with existing methods. Proposed a novel method that leverages other modalities of data (specifically text) to improve the accuracy of image manipulation detection. Built an end to end multi-modal model that can be readily used for various real world applications.
-  **Defense Advanced Research Projects Agency (DARPA)**, *Research Assistant*. [May 2022 - Aug 2022]
- **Generator Attribution.** Developed a deep learning classifier to detect and identify the generator that was used to create falsified images. Adversarially trained a Resnet50 to identify various generators including a mix of GANs and Diffusion models such as StyleGAN2, StyleGAN3, taming-transformers, latent-diffusion, LSGM, and CLIP-guided-diffusion. Achieved an accuracy of over 98 percent. The model could be deployed in various applications, including detecting deepfakes, identifying image tampering, and detecting fake news.
-  **Oravel Stays Pvt Ltd (OYO)**, *Software Development Engineer II* [June 2019 - Aug 2021]
- Designed and implemented new micro services, breaking the monolith traum service (legacy system) which enabled better scalability, maintenance and efficiency.
 - Designed a big data architecture to queue and manage time-consuming tasks on distributed clusters using Kafka. Worked to build a more maintainable alternative to a complex architecture and implemented safe interfaces to migrate large scale production data stored using it.

Research Publications

Conference Proceedings

-  1 D. Spoorthy, S. R. Manne, V. Dhyani, *et al.*, “Automatic identification of mixed retinal cells in time-lapse fluorescent microscopy images using high-dimensional dbscan,” in *2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2019, pp. 4783–4786.  DOI: 10.1109/EMBC.2019.8857375.

Academic Research

- **Manipulating Stochastic Gradient Descent with Data Ordering Attacks** Implemented data ordering attacks by taking advantage of stochasticity of SGD and the fact that order of data influences training procedure. We introduced different attacks like Batch reordering, Batch reshuffling and Backdoor where, a surrogate model is trained simultaneously with a source model to reorder the data points with respect to the losses or gradients. Different kinds of source and surrogate models used were as follows: LeNet, ResNet18, ResNet50, ViT-b-16.
- **Multilingual Emoji Prediction** Fine-tuned Transformer based discriminative (MultiBERT, Multilingual-MiniLM-L12-H384, XLM-Roberta, mDeBERTaV3) and generative (GPT-2, DistilGPT-2, GPT-Neo-125M) Large Language Models (LLMs) on English and Spanish tweets to predict emojis. The models are trained on a dataset of 500K English tweets and 100K Spanish tweets retrieved from Twitter API and tested on 50K English tweets and 10K Spanish tweets. The experiment outperformed the baseline of SemEval Competition in terms of overall accuracy.
- **COVID-19 Instagram posts emotion detection using Sentiment140 dataset.** Developed a machine learning model to predict the emotions in Instagram posts related to COVID-19. Started with simple baseline models such as Naive Bayes and Logistic Regression, but eventually switched to BERT (Bidirectional Encoder Representations from Transformers) architecture. Conducted an analysis of the predictions and found a correlation between the presence of fear and anger emotions with the presence of an East Asian person in the image.
- **Pneumonia Detection in Lung Ultrasound Images using Deep Learning** Developed a classification model using ResNet and Vision Transformer to classify Lung Ultrasound images for pneumonia detection.
- **Video Path Tracking** Developed an algorithm to track the path of the camera in videos using visual odometry. For each pair of image frames of the captured video we find the rotation and translation matrices that describe the motion flow between two image frames in monocular scheme.

Skills

ML/AI	■ Machine learning, Deep Learning, Natural Language Processing, Computer vision, Transfer Learning, Data Analysis, Python programming, Model fine-tuning, Data structures, Data modeling, Data visualization, Regression, Clustering and classification, Web scraping, Time-series Analysis, Statistics.
Libraries	■ Numpy, OpenCV, PyTorch, Tensorflow, Matlab & Simulink, Jupyter Notebook, Keras, Pandas, Scikit Learn, nltk, Gensim, spaCy, TextBlob.
Software	■ C, C++, Python, Java(Spring Boot), PHP(Laravel), MySQL, PostgreSQL, HTML, CSS, JavaScript, NodeJS, AngularJS, Prometheus, Graphana, Kafka, Kibana, Kubernetes, Git, Eclipse, JetBrains, Linux.