Bharat Runwal

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EDUCATION

Indian Institue of Technology,Delhi *2018-2022*
B.Tech in Electrical Engineering
(Power and Automation)

RESEARCH EXPERIENCE

IIT Delhi, India Nov 2020-Ongoing
Undergraduate Researcher| Supervisor: Prof. Sandeep Kumar
Robust Graph Neural Networks via Adaptive Weighted Laplacian: April 2021-November 2021

- Proposed state-of-the-art robust graph structural learning framework for poisoning targeted and non-targeted attacks
- The method is based on the adaptive weighted feature smoothness of perturbed graph and graph laplacian
- We show efficacy of our proposed method on the cora and citeseer datasets & our framework is computationally very efficient($\sim$30x) than previous works

Koç University, Turkey June 2021- October 2021
Research Intern | Collaborators: *Arunava Das,Dr. Oktay Cetinkaya,Prof. Ozgur B. Akan* *Remote*
Received Signal Modeling and BER Analysis for Molecular SISO Communications:

- Proposed a PSO based SISO model for estimation of number of particles received at the receiver which is robust to noise and Inter symbol interference introduced during the diffusion process
- Our method achieved state-of-the-art performance for estimating number of molecules with RMSE error compared to other proposed works($\sim$15 times better).

HPI Potsdam, Germany Oct 2020- May 2021
Research Intern | Supervisor: Prof. Gerad De Melo *Remote*
Graph-based Sense Embedding Induction:

- Proposed a novel graph based approach to obtain sense embeddings based on relational constraints
- The method is based on the deconflation approach with additional constraint satisfaction enforcement
- Our proposed method provides competitive performance to the other methods on Simlex-999 and Simverb-3500 datasets across different part of speeches

WORK EXPERIENCE

AlphaICs,Bangalore June 2021- August 2021
Research Intern | Supervisor: Sooraj KC *Remote*
- Worked on Quantization of models using Quantization Aware Training for Object Detection and classification
- Performed Quantization analysis layer by layer to locate the degradation layers explicitly
- Worked on Zero Shot quantization framework which uses the batch normalization statistics to generate the distilled dataset

Omdena June 2021- August 2021
Junior Machine Learning Engineer *Remote*
- In collaboration with RenewSenses LTD, an Israeli company developing assistive technologies for people who are blind, this project involves assisting people with visual impairment in their experience of catching a bus
- Mainly Contributed in team for Bus Detection and Tracking , where my goal was to track the "front of the bus" in the video real time
- For the efficient inference on cpu , used opencv tracker(MOOSE) at the tradeoff between accuracy and speed.

Zevi.Ai May 2021-June 2021
NLP intern *Remote*
- Worked on building a vernacular search engine for e-commerce applications with features like price tag detection from query, autocomplete,spell check.
- Used DistillBert/XLM-R(Multilingual) from Huggingface library for getting the contextual embeddings for preprocessed query.
- Used Faiss library for faster indexing and efficient similarity search for large number of dense embeddings of dataset.

Projects

Weighted Signed Graph Attention Networks| *Course Project*   November 2021
- Enhanced the learned embeddings of the network nodes by adapting the loss function of the SiGAT Model to the weighted signed graphs
- The learned embeddings shows better inter class seperability in the embeddings space

Visual Sudoku Solver | *Course Project*   May 2021
- Trained a Conditional GAN on a given set of character images, with single labeled example from each class
- Using the labeled data generated from CGAN,naively solved the given Sudoku Puzzle using RRN(Recurrent Relational Network)
- Explored joint optimization i.e. using the constraints of Sudoku to improve the conditioning of GAN

Generating Summaries & Sentiment prediction of Financial news| *Self Project*   June 2020
- Used Google PEGASUS model from Huggingface for abstractive summarization,with preprocessing of the newspaper articles
- Used FinBERT(Financial BERT) model for sentiment prediction of generated summaries and got ROGUE-1 score of 40.6
- Used various preprocessing like: Extracting Cardinal or price entity for getting the information about stock prices

Face Recognition and Emotion Detection Web App | *Self Project*   July 2020
- Created a flask web app with face and emotion recognition integrated into the browser using TF.js and SocketIO
- Flask.js API for face recognition in the browser which uses ResNet-34 like architecture to compute a face descriptor
- Improved FPS by integrating TF.js resources with Flask by using SocketIO(JavaScript library)

Anomaly Detection in Time series Data of S&P500 | *Self Project*   May 2020
- Used LSTM Autoencoder to detect anomalies related to sudden change in close price of S&P500(stock market index)
- Dataset was obtained from Kaggle which was from 1986-2020,used 30 timesteps and set Anomaly threshold of 0.65

Academic Achievements

- Among the top 50 students(out of 800 students) to get a **Department Change**, in first year
- Among Top 1% in Joint Entrance Examination(JEE Advanced 2018) among 62k candidates

Technical Skills

Languages: Python,Java,C++,JS ,MATLAB
Frameworks: Pytorch,Tensorflow,Keras,Flask,FastAPI
Utilities: OpenAIGym,OpenCV,Git,Docker,AWS,LATEX,Linux shell utilities

Teaching Experience

- Teaching Assistant for Advanced Machine learning(Spring 2022)
- Academic Mentor of Introduction to Electrical Engineering(Fall 2019)

Relevant courses

Computer Science: Deep learning, Machine learning,Computer Vision,Natural Language Processing ,Meta Learning, Data Mining ,Social Network Analysis, Data Structures and Algorithms
Mathematics: Probability and Stochastic Processes,Introduction to Linear Algebra and Differential Equations, Introduction to Calculus.
Electrical: Optimization Theory,Signals and System, Circuit Theory, Digital Electronics,Embedded Systems,Control Engineering,Communication engineering
MOOC/Online: CS224W(Machine Learning with Graphs),CS231n(Visual recognition),CS224n(Natural Language Processing with Deep Learning)(Stanford),GAN specialization,Deep learning specialization(Coursera)