AYUSH GOYAL

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Education

University of Southern California — June 2024 - Present
Masters in Computer Science - GPA: 4.0/4.0 — *Los Angeles, CA, USA*
Research Assistant, DILL Lab

Indian Institute of Technology Delhi — July 2019 – May 2023
B.Tech. in Mathematics and Computing - CGPA: 9.078/10.0 — *Delhi, India*
Teaching Assistant: For an undergraduate course: Machine Intelligence & Learning

Skills

Languages/Tools: Python, C, C++, Java, MATLAB, Verilog, Standard ML Git, LATEX, Autodesk Inventor

Frameworks/Libraries: PyTorch, TensorFlow, CVXOPT, Keras, Sklearn, Numpy, Pandas, Jupyter

CourseWork: Computer Vision, Natural Language Processing, Machine Learning, Data Mining, Data Structures and Algorithms, Multimedia Systems, Analysis and Design of Algorithms, Computer Architecture, Theory of Computation, Operating Systems, Probability and Stochastic Processes, Statistical Methods

Work Experience

Korea Advanced Institute of Science & Technology — Research Assistant — August 2023 – June 2024
Prof. Jaesik Choi and Research Prof. Nari Kim — *Statistical Artificial Intelligence Lab*

- Enhanced efficacy by leveraging **dependency parser**-based syntactic units, resulting in **7%** increase in metric scores
- Evaluated **LIME, SHAP, IG, LRP** and **Attention** on text classification models for **Plug and Play** XAI project
- Developed a pipeline to provide the best explainer algorithm for particular text-based models to build trustworthiness

Adobe - Research Intern — June 2022 – August 2022

- Implemented **Quantization-Aware Training** algorithm for GANs to optimize model size and performance in PyTorch
- Analyzed *layer-wise sensitivity* of StyleGAN2 by estimating average Hessian matrix trace via **Hutchinson algorithm**
- Achieved a high compression ratio of **6.5 times** with negligible degradation in FID score compared to original model

University of Sussex - Research Intern — May 2021 – July 2021
Prof. Novi Quadrianto — *Predictive Analytics Lab*

- Investigated the feature of equivariance of image segmentation to affine transformations, to achieve near fully supervised semantic segmentation based on image-level annotations

Project Experience

Intent based CounterSpeech - *Prof. Niladri Chaterjee*

- Developed end to end **multimodal transformer pipeline** using a **proprietary** dataset for generating counterspeech
- Achieved **88%** top-2 accuracy and **0.59** Pearson Correlation in identifying the best-intent CounterSpeech

Claim Span Identification (CSI) - *Prof. Tanmoy Chakrobarty*

- Mitigated the overfitting problem in the SOTA DABERTA model for CSI by focusing on the fully connected layers
- Developed a heuristic post-processing algorithm based on **EDA**-derived claim span properties
- The modifcations improved the Model's F1 score from 0.834 to 0.842 and also decreased the training time

Transfer Learning on CNNs - *Prof. Brejesh Lall*

- Initialised VGG-16 and ResNet-18 for MNIST & CIFAR-10 datasets, attaining test accuracies of 98.9% and 86.2%.
- Improved accuracy of MNIST classification by fine-tuning a pre-trained ResNet-18, achieving accuracy of 88.3%

Multi-Threaded Junction Management System - *Prof. Ashutosh Rai*

- Created C program to optimize memory access and **reduce page faults** by implementing page replacement strategies
- Program handled trace files, monitor memory accesses, and analyze disk operations to enhance memory management

Memory Management and Page Replacement Algorithms - *Prof. Ashutosh Rai*

- Implemented master thread in C to ensure **liveness** and **prevent starvation** within the concurrent system
- Utilised multithreading, condition variables, and mutex to ensure safety by allowing one train per lane at a time

Leadership & Involvement

Coordinator, Mathematics Society, IIT Delhi: Led team of 30+ members, organized events related to mathematics

Academic Mentor, IIT Delhi: Cleared doubts and assisted in teaching for the Introductory Electrical engineering course