KSHEER SAGAR AGRAWAL

Machine Learning for Systems • Systems for Machine Learning • Cloud Computing

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EDUCATION

Indian Institute of Technology, Gandhinagar (IITGN) — CPI: 8.71/10.0
B.Tech. Electrical Engineering with Minors in Computer Science and Engineering [Transcipt] — 2020-2024

Delhi Public School, Mumbai — Percentage: 94.0%
Class XII, Central Board of Secondary Education [Transcipt] — 2019-2020

Delhi Public School, Mumbai — Percentage: 95.8%
Class X, Central Board of Secondary Education [Transcipt] — 2017-2018

EXPERIENCES

Amazon | Software Development Intern | Migration to Serverless Computing

Mentor: Rohit Sharma | Amazon Go | Just Walk Out Technology | Certificate — *May '23 - July'23*

- Worked in the Store Monitoring Squad in the Inventory Health Management Team at Amazon Go.
- Worked with Java, TypeScript, Spring Boot, AWS CDK, AWS Cloud Watch, AWS Lambdas, and other Amazon internal tools.
- Migrated & Optimised IhmWatchtowerTools (Store Monitoring Service) to a server less architecture using AWS Lambdas. Reduced Lambda run time from 45 to 30 seconds, reducing per store costs.
- Defined EventBridge and Alarms based on AWS Cloud Watch metrics to trigger Lambdas and monitor store updates.
- Reduced DevOps workload by reworking DeviceTeams Code Logic, simplifying the onboarding of new devices, and improving code modularity.
- Stressed on on good quality documentation and contributed valuable bugs solution's on Amazon's internal platform, Sage.

ACADEMIC RESEARCH PROJECTS

Effects of Structured Pruning on Handling Uncertainty Estimates

Research Project • Advisor: Prof. Nipun Batra • Poster • Report • Code — *August'23 - November'23*

- Developed a comprehensive library for Structured Pruning Techniques in deep neural networks, providing standardized and extensible functionality for training, pruning, fine-tuning, computing metrics, and plotting.
- Implemented and compared various accuracy and uncertainty metrics for different pruning techniques, inspired by the "Lottery Ticket Hypothesis" research paper.
- Conducted detailed out-of-distribution analysis, particularly on CIFAR100 dataset, demonstrating improved model calibration and decision-making robustness in pruned models.

DeblurGAN: Motion Deblurring Using Deep Generative Adversarial Network

Research Project • Advisor: Shanmuganathan Raman • Poster • Code — *August'23 - November'23*

- Implemented a PyTorch-based GAN model for motion deblurring, inspired by the "Deep Generative Filter for Motion Deblurring" research paper. Our implementation incorporates optimizations and improvements, achieving remarkable performance through cutting-edge techniques.
- Utilized the Learned Perceptual Image Patch Similarity (LPIPS) loss function, Differential Augmentation and Wasserstein GAN loss for accurate color contrast, consistent gradient flow, stability, and convergence during training.
- Developed a user-friendly codebase to encourage experimentation with different settings for optimal deblurring results.

SELECTED PROJECTS

Academic Request Database System

Institute Building Project • Supervisor: Prof. Dilip Srinivas Sundaram • Code — *August'21 - December'21*

- Database system used by college community and academic office to make and handle requests for academic documents such as Transcripts, Fee Receipts and many more.
- Technology Used: NodeJS, Express, Google Authentication, Google Sheets, Apps Script, Heroku Cloud Services.

Open Source Career Fair Application

Course Project • Advisor: Prof. Mayank Singh • Code — *January'23 - April'23*

- Can be used by various college campuses and recruiters as a database and to communicate during the process of hiring of students on campus for Internship and New Grad Roles
- Technology Used: HTML, CSS, Bootstrap JQuery, Python, Django, MySQL.

IoT SentryRover

Course Project • Advisor: Prof. Jhuma Saha • Code *January'23 - April'23*

- Features Obstacle Detection Algos, Sim28ML GPS & ESP8266 Camera module for live-tracking & wide-range IoT control.
- Developed a web-application to control and monitor an STM-based surveillance robot using NodeMCU communication protocol and STM-32 micro controller.

Statistical Language Modelling Using N-grams

Course Project • Advisor: Prof. Mayank Singh • Code *January'22 - March'22*

- Used the Trigram Model to predict the next word and find the perplexity of a given sentence.
- Technology Used : Python, Natural Language Toolkit, HuggingFace.

Image Segmentation using Random Walker Algorithm

Course Project • Advisor: Prof. Shanmuganathan Raman • Code *September'22 - October'22*

- Implemented the Random Walker Algorithm for image segmentation, involving marked and unmarked pixel nodes.
- Calculated the probability of neighboring pixels adopting the same value based on pixel intensity differences.
- Utilized the combinatorial Dirichlet problem solution to determine final probabilities for pixel labels.
- Performed matrix calculations, and constructed a new image from calculated probabilities with a pixel accuracy of 93.7%.

Real-Time Object Tracking using Gaussian Mixture Models

Course Project • Advisor: Prof. Shanmuganathan Raman • Code *October'22 - November'22*

- Processed and analyzed a 30-second traffic video from YouTube, using OpenCV for frame extraction.
- Applied GMM to model pixel values, enhancing background-foreground distinction for precise object tracking.

Face Recognition Using Eigenfaces & Principal Component Analysis

Course Project • Advisor: Prof. Shanmuganathan Raman • Code *August'22 - September'22*

- Processed a dataset of 546 grayscale face images (112x92 pixels) using PCA to reduce dimensionality, and selected/normalized the top 350 eigenvectors for efficient face identification.
- Attained a 94.97% recognition accuracy on 20 test images through linear projection and distance comparison.

TEACHING EXPERIENCE

- **Certification in Teaching Program, IIT GN** - Completed a 6-week long program engaging in practice modules and seminars aimed at developing and enhancing teaching skills.
- **Teaching Assistant, Data Structures & Algorithms, IIT GN** *Aug'22 - Nov'22*
  Designed and evaluated weekly lab assignments of this graduate level course,mentored lab sessions, prepared interactive demos and quizzes, and other logistical responsibilities for a total of 204 students.
- **Teaching Assistant, Data Structures & Algorithms in C++, Coding Ninjas Ed.Tech Company:** *July'22 - Aug'22*
  Actively participated in resolving programming and debugging doubts for 100+ students at Coding Ninjas.

AWARDS AND ACHIEVEMENTS

- Achieved Top 25 selection in India for the **SIA Youth Scholarship** selection test held at Radisson Blue, Delhi.
- Developed an impactful Institute Building Project, implementing a streamlined database system for the Academic Office.
- Received the **Dean's List Award** for outstanding academic performance in four out of five eligible semesters.
- Attained the third position in the Ignite '21, IIT GN, Competitive Programming challenge.
- Recognized as the **Best Emerging Badminton Player'22**, receiving the award from the Dean of Student Affairs.

TECHNICAL SKILLS

Languages: Python | Java | C++ | Javascript

Tools: Git | VS Code | SQL | Anaconda | LaTeX | Arduino

Libraries and Frameworks: Keras | PyTorch | OpenCV | Pandas | C++ STL | JQuery | Spring Boot | ExpressJS

Cloud/Databases MongoDB | MySQL | AWS CDK | AWS Console | AWS Cloudwatch | AWS Lambda | AWS S3

POSITIONS OF RESPONSIBILITY & EXTRA CURRICULAR

- **Class Representative** @ Electrical Engineering IITGN - Worked in close liaison with the Professors for smooth functioning of academic activities. *2022 - 2023*
- **Problem Setter & Member** @ GRASP Club - Conducted biweekly/monthly programming contests for the college community. *2022 - 2023*
- **Badminton Captain** @ IITGN - Led a team of 5 players at the prestigious Inter-IIT Sports Meet'22. *2022 - 2023*