Gunjan Dhanuka

Roll No.: 200101038
B.Tech - Computer Science and Engineering
Minor in Robotics and Artificial Intelligence
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EDUCATION

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech.	Indian Institute of Technology, Guwahati	9.07 (Current)	2020-Present
Senior Secondary	CBSE Board	97.6%	2020
Secondary	ICSE Board	97.5%	2018

RESEARCH EXPERIENCES

Carnegie Mellon University, USA *May 2022 - Ongoing*
Research Intern under the supervision of Dr. Min Xu in Xu-Lab *Pittsburgh, USA (Remote)*
- Submitted our research paper to the **CVPR 2024** conference, with an improvement of **1.36%** over the state-of-the-art on the **Weakly-Supervised Video Anomaly Detection** task on the UCF-Crime and ShanghaiTech datasets.
- Proposed a novel **Temporal Aggregation Module** which is based on **Disentangled Cross Attention** to aggregate the representations of multiple backbones and distil the knowledge using **Bi-level Knowledge Distillation**.

Indian Institute of Technology, Guwahati *July 2023 - Ongoing*
Bachelor Thesis Project under Dr. John Jose & Prof. Sukumar Nandi in MARS Lab *Guwahati, India*
- Proposed a new **Black Hole Router Attack** threat model on **Network-on-chip** on the cache, processor and network levels.
- Analyzing the impact on L1 and L2 cache misses and penalties, CPU-wise IPC values and average packet latency using the **gem5 simulator**, and coming up with possible detection and mitigation techniques for such attacks.

Indian Institute of Technology, Guwahati *Nov 2023 - Ongoing*
Research Project under Dr. Arijit Sur in Multimedia Lab *Guwahati, India*
- Working on **Adversarial Defense** on 3D Human Pose Estimation models using **Diffusion Models** to implement a **generator-discriminator-classifier** training paradigm to train a robust downstream classifier against adversarial perturbations.

University of New South Wales (Sydney) & CSIRO Australia *Nov 2021 - May 2022*
Research Intern under Dr. Rohitash Chandra (UNSW) & Dr. SS Vasan (COVID-19 Science Leader, CSIRO) *Sydney (Remote)*
- Extracted and visualized **graph representation** of Protein Structures of various virus strains of **SARS-CoV-2**.
- Analyzed **Node and Edge Centralities** in the graph to correlate and predict significant mutations in the strains.

INDUSTRIAL EXPERIENCE

Rubrik Inc. *May 2023 - July 2023*
Software Engineering Intern in the RSC-P Platform team *Bengaluru, India*
- Implemented **Multi-Node Scaling Support in RSC-P Cluster**(Rubrik Security Cloud - Private) using **Kubernetes**.
- Developed a **Command Line Interface (CLI) in Golang** for the users to add/remove nodes to an existing RSC-P Cluster, view cluster status, and perform live updates using **Gravity**, an open-source Kubernetes-management service.
- Devised and implemented a **Leader-Worker architecture** to **pin the stateful services** like Object Storage, Database, and Messaging Queue on the leader node, while **scaling the stateless services automatically** to the newly joined nodes.

KEY PROJECTS

Model Extraction Attack for Video Classification Models *Mar 2022*
Silver Medal, Inter-IIT Tech Meet, 2022 (held at IIT Kharagpur) *Final Report Link | GitHub Link*
- Developed **Swin-T** and **MoViNet-A2** model extraction pipelines through synthetic query generation using image datasets.
- Trained **Temporal Segment Networks (TSNs)** and **EfficientNet-LSTM** models in Greybox and Blackbox settings.
- Used multiple stacked image sets to craft adversarial samples and performed class-based analysis to extract model parameters.

Route Planning and Optimization with Volume Estimation for Last-Mile Deliveries *Feb 2023*
Inter-IIT Tech Meet, 2023 (held at IIT Kanpur) *GitHub link*
- Performed **volumetric weight estimation** of objects using a stereoscopic RGB Camera setup and developed an **end-to-end physical system** to measure the dimensions of the object with very low latency and ∼**95%** accuracy.
- Used DNNs to classify the shape of the object and for background removal to estimate the pixel per metric ratio. Used similarity scaling and background averaging to predict accurate object height.
- Optimized the last-mile-delivery problem by devising optimal rider routes, incorporating dynamic pickups and forming rider bags using 3-D Bin Packing heuristics. Improved scalability by using an iterative sweep clustering algorithm.

NanoC Compiler *May 2022*
Guide: Prof. Sukumar Nandi | Compilers Lab, IIT Guwahati *GitHub Link*
- Developed a compiler for Nano-C, a subset language of C having essential features like I/O management, error-handling, and control statements using **Lex, Bison, and C++**.
- Implemented generation of **assembly language quads** for the given code and an executable for the same.

OTHER PROJECTS

xv6: Unix-based Operating System *May 2022*
Guide: Prof. John Jose | Operating Systems Lab, IIT Guwahati *GitHub Link*
- Implemented a **SJF** and **Round-Robin** based **hybrid scheduling algorithm** and tested for CPU and I/O bound tasks.
- Incorporated **lazy memory allocation** & **dynamic page swapping** based on LRU policy for active processes.

Semantic Word Embeddings Visualizer - Word2Vec *May 2022*
Self Project *GitHub Link*
- Deployed **Gensim Word2Vec model** with custom parameter tuning, **interactive semantic similarity plots**, and **training-on-the-fly** features. Option to upload custom text corpus or tabular conversational data also provided to the user.

360° images-based VR Tour of Majuli Island (Govt. Funded Project) *May 2022*
Guide: Prof. Samit Bhattacharya | Software Engineering Lab, IIT Guwahati *GitHub Link*
- Developed a **VR application** for a **3D tour** of Majuli Island using **300+ 360°images** and videos in **Unity** for Oculus Rift, also implementing interactive objects, movement, and maps for navigation and teleportation using **C# scripts**.

Sentiment-based Reinforcement Learning for Stock Trading *Jul 2022*
Self Project *GitHub Link*
- Performed **Text Summarization** and **Sentiment Analysis** of scrapped News Articles using *PEGASUS* model. Trained the **A2C model** on a custom environment in **OpenAI gym** using **scrapped data**, adding **SMA, RSI and OBV** indicators.

ACHIEVEMENTS

Research Conclave Hackathon IITG	Awarded with the **first prize** for the best solution to manage on-campus COVID-19 outbreak.	2022
Amazon ML Challenge	Secured a **rank of 26** from over **5000 teams** in a two-day competition.	2023
Inter-IIT Technical Meet 2022	Won the **Silver Medal** in the Model Extraction High Prep competition.	2022
Amazon ML Summer School	Selected to attend ML lectures from more than **17,000 students in India**.	2022
Reliance Foundation Scholarship	Selected as one among **37 students across India** as future leaders in AI.	2021
JEE Mains 2020	Secured **All India Rank 382** out of approx. **1,100,000** candidates.	2020
JEE Advanced 2020	Secured **All India Rank 469** out of approx. **250,000** candidates.	2020
KVPY Fellowship	Selected as **KVPY Scholar** out of **40,000** candidates in the SX Stream.	2020

TECHNICAL SKILLS

Programming languages: C, C++, Python, Golang, Javascript **Software Dev:** Django, Flutter, Firebase, React*, Node.js*
ML/AI: Pytorch, Tensorflow, Numpy, Pandas, Matplotlib **Miscellaneous:** MySQL, Git, Shell, LaTeX, Kubernetes

RELEVANT COURSEWORK

- **Computer Science:** Machine Learning, Computer & Network Security, Hardware Security, Compilers Lab, Operating Systems, Computer Networks, Parallel Algorithms, Software Engineering, Data Structures & Algorithms, Database Management Systems, Deep Learning Specialisation(Coursera).
- **Mathematics:** Linear Algebra, Calculus, Probability Theory & Random Processes, Mathematical Finance.
- **Robotics and AI:** Introduction to Robotics, Mechatronics, Robotic Vision and Control, Fundamentals of AI.

TEACHING EXPERIENCE

- **Computer Science**: Taught data structures and algorithms to ∼500 first-year students at IIT Guwahati as part of CSEA.
- **Physics**: Taught high-school Physics for entrance exams to ∼60 underprivileged students in a charity initiative by Edvizo.

LEADERSHIP POSITIONS

- **Contingent Leader IIT Guwahati, Inter-IIT Technical Meet 2023** *(Present)*: Managing the entire contingent of IIT Guwahati of over 150 students, competing in 12 challenging industry problem statements against 22 other IITs.
- **Coding Club, IIT Guwahati**
  - **Secretary** *(2022-23)*: Overall leadership of one of the largest college coding clubs of India (∼10,000 followers, 100 members) and its activities, which included conducting national-level hackathon, preparing programming courses, conducting live workshops, and releasing summer projects. Conducted CodePeak (∼5000 participants, nationwide Open Source event) and Ethos (∼1500 participants, largest hackathon in North-East India).
  - **Co-ordinator** *(2021-22)*: Raised awareness about opensource activities on campus by conducting live Git-GitHub workshop, and coordinating the conduction of CodePeak.
- **Computer Science and Engineering Association(CSEA), IIT Guwahati**
  - **Treasurer** *(2023-Present)*: Managing the finances along with the overall planning and execution of CSEA's activities, especially driving the planning of a new Undergraduate Research Program.
  - **Technical Executive** *(2022-23)*: Organising guest talks, research awareness sessions, hackathons, and coding contests to enhance the coding culture on the IITG Campus.

EXTRACURRICULARS

- **Quizzing:** Won the fifth prize in India Quiz at Inter-IIT Cultural Meet 2023 and was a National Finalist at Aqua Regia School Quiz 2016 (top 8 teams among 2.4 lakh students).
- **Trekking:** Completed the Valley of Flowers *(ht: 14,100 ft.)* and Brahmatal Treks *(ht: 12,250 ft.)* in the Himalayas, and several short treks in the Western Ghats.