Aaditya Baranwal

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Education

Indian Institute of Technology — Jodhpur, Rajasthan
Bachelor of Technology in Electrical Engineering, Specialization in Visual Computing — *Nov. 2020 – Present*

Sant Atulanand Convent School — Varanasi, UP
Senior Secondary Certificate — *Aug. 2018 – May 2020*

St. John's Convent School — Varanasi, UP
Higher Secondary Certificate — *May 2016 – May 2018*

Key Experiences

Deep Learning Researcher — June 2023 – Present
Bosch Global Software Technologies — *Bengaluru, IN*

- Pioneered analysis and finetuning of Vision Foundation Models for Autonomous Driving applications including Detection and Segmentation.
- Empowering the Segment Anything Model to interpret prompts of text modality, harnessing the transformative capabilities of a Visual GPT-inspired architecture.

Deep Learning and Computer Vision Intern — June 2022 – July 2022
Dimensionless Technologies — *Bengaluru, IN*

- Built a scalable end-to-end pipeline to discriminate between highly similar commodity images by modeling EfficientNets with Residual Attention architectures with Siamese and Contrastive tails after applying Unsharpening and CLAHE Histogram equalization Image Processing Techniques.
- Developed a Counterfeit detection AI service for e-commerce platforms, including Amazon and Flipkart, and trained the model on Multicluster HPCs with CUDA

Artificial Intelligence and Machine Learning Software Intern — May 2022 – June 2022
GMAC Intelligence — *Bengaluru, IN*

- Customized Object Detection TFlite app Enabling Deep learning model of Java-based Android Tflite model to inference on Hexagon delegate (Snapdragon Processor) and GPU delegate.
- Experimented with designing the optimal job distribution of the TFlite Models over Processing Units tailored task-wise.

Team Leader - R2 — Dec. 2021 – Apr. 2022
Team ABU ROBOCON IIT Jodhpur — *Rajasthan, IN*

- Coordinated the team working on the mechanism of the R2 seeker by Ideating and calculating the motion dynamics and working dynamics of the R2 seeker bot and assigning the members tasks suiting their forte. Implemented DETR fine-tuned for the ball target locking with the CV-AI sub-Team.
- Documented and Drafted the Final Technical report of our Proposed Robots, achieving an outstanding score of 100/100 in Round 1.

Python Developer — Jan. 2021 – Apr. 2021
Mathrithms — *Rajasthan, IN*

- Extending BunnyCDN's cloud and storage services, creating a Python SDK, allowing functionalities of BunnyCDN apiary through python, accessible on any system through pip.
- Achieved a total count of 45000+ global downloads for the developed SDK from PYPI

Key Projects

Gesture Controlled AMR - VOWEL | *Python, ROS, TensorFlow, PyTorch, Gazebo* — Mar. 2022 – Aug. 2022

- Proposed a solution to void the negative impacts of Technological advancement in the mining industry and bagged the Title of Mobility Innovation Challenge Winner by innovating a Vision-based semi-Autonomous Mining Robot.
- Modeled AI, ROS, Communication & Control Pipeline, Instance Segmentation (K-means & Neural-Net architectures), Hand detection(YOLO & Keypoint Mapping), and real-time gesture action classification (LSTM) using robust Parallel Processing with Reinforcement Learning for Autonomous Visual-Servoing and Navigation.
- Used Github to work collaboratively and created a simulated POC on Gazebo

Subject Reason Semantic Matching on Online Reviews | *PyTorch, Huggingface* Dec. 2022 – Jan. 2023

- Created a three-stage sequential pipeline matching the review texts with review reasons:
  •Calculating sentiment score on texts and reason separately and filtering out the samples where the score difference is more significant than 30%.
  •Applying contrastive BERT (wordnet pre-trained) on the streamlined list to fetch matching texts and reasons.
  •Using a BERT supervised for the downstream classification on the order correctness of text and reason.
- Achieved an AUC-ROC score of 0.78 on a class-Imbalance dataset with only positive samples where negative samples were created intuitively by random text-reason pairing.

DRDO's UAV Guided UGV | *Python, OpenCV, ROS, Shell, Linux* Feb. 2022 – Apr. 2022

- Ideated a traveling algorithm for UAVs and implemented it using K-means segmentation, Depth-Vision for trajectory construction, and PID control for stable path-following capability using Differential Kinetics.
- Created a Computation economic pipeline achieving an optimized flow of ROS code for Image processing and Robot Control Mechanisms.

Robotic Precision Echocardiography | *(TensorFlow, OpenCV, ROS, Matlab, Arduino* Mar. 2022 – Aug. 2022

- Designed and Proposed a robust Stewart Platform - AI System to ascertain different camera-target configurations in real-time. High precision owing to real-time sensitivity of healthcare data.
- The created physical prototype of the platform relays autonomously to the desired configuration using imagery(Extracted Feature Pyramid) of the human heart for accurate Echocardiography.

Speech Emotion Recognition | *PyTorch, TensorFlow, Python, HTML, CSS, JS* Feb. 2022 – May 2022

- Augmented and Pre-processed the Audio data to task-relevant variations, Applied STFT Algorithm generating Chroma Vector, and fed the data to models including xgboost, shallow MLP, and LSTM(RNNs).
- Developed a web App and deployed the best model chosen based on accuracy metrics to determine Emotional State from speech using standard phrases using Javascript, Html, and CSS.

Achievements

Winner Michelin Mobility Innovation Challenge 2022
Ranked 7th among 23 participating IITs (Techmeet 10.0 DRDO UAV) 2022
Bagged a Perfect Score of 100/100 ABU Robocon '22 2022
Ranked 4th in Samsung NLP challenge(Kaggle) 2022
All India Rank-65 ISI Entrance Test 2020

Skills

Programming Languages | *Python, C++, Matlab, Unity, SQL, HTML, CSS, JavaScript, Shell, Verilog*
Tools & Utilities | *ML Ops, AWS, Git, Docker, Excel, LaTeX, OpenAI-Gym*
Libraries | *PyTorch, TensorFlow, OpenCV, SkLearn, Numpy, Pandas, etc.*
Theoretical & Applied | *Deep and Reinforcement Learning, Stable Diffusion, Computer Vision, NLP/NLU, Robotics*

Coursework

Computer Vision Ongoing
Deep Learning Ongoing
Embedded Systems Ongoing
Pattern Recognition and Machine Learning Completed
Data Structures and Algorithms Completed
Computer Architecture Completed
Control Systems Completed

Positions of Responsibility

Coordinator of Artificial Intelligence and Data Science Society of IIT Jodhpur 2022 - Present
Secretary of Literature Society IIT Jodhpur 2022 - Present
Joint Secretary of Literature Society IIT Jodhpur 2021 - 2022
Core Member of Robotics Society IIT Jodhpur 2021 - Present
Student Moderator of Newsletter Society IIT Jodhpur 2021 - 2022