Siddharth Singh Solanki

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Education

Georgia Institute of Technology, Atlanta, USA [2022 - Present]
- Master's in Computer Science (Specialisation: Machine Learning)

Indian Institute of Technology Goa, Farmagudi, India [2018 - 2022]
- B.Tech in Computer Science and Engineering (**CPI 9.72/10**) Bronze Medalist, ranked second in the batch

Technical Skills

- **Programming:** Python, C++, C, Bash, OpenGL, SQLite, JavaScript
- **Softwares/Libraries:** PyTorch, MATLAB, LaTeX, Android Studio

Internships

- **MathWorks**, Natick, USA [2023]
  - Worked with MATLAB and C++ codebase along with Simulink's parallel compute library.
  - Developed a function that allows users to define and execute custom progress trackers and plots for parallellized simulations without compromising the simulation speed.
  - It **reduces the execution time for a typical user workflow upto 10X** for simulations involving 3-D plots in aerospace and automotive applications.
  - Wrote unit, system tests and customer facing documentation. **Code will be shipped with 2024-a release of MATLAB**.
- **MathWorks**, Hyderabad, India [2021]
  - Worked with C++, MATLAB and JavaScript codebases.
  - **Optimized automated CNN deployment** feature for Intel architecture GPUs. Performed memory optimizations through techniques such as buffer reuse, layer fusion and minimized data transfer between CPU and GPU.
  - **Achieved 2X speedup in training popular CNNs** such as ResNet, VGG-16 and AlexNet.
  - In another project, worked on **full stack feature development** for a MATLAB application in the signal processing toolbox.
  - Performed testing for deployment, code was **shipped with 2022-b, 2023-a release of MATLAB**.
- **Machine Vision Lab - IIT Roorkee**, Roorkee, India [2020]
  - Computer Vision research under Prof. Balasubramanian Raman. Worked on moving hand sign recognition problem.
  - Used optical flow for sampling frames and extracted features by detecting keypoints and finetuning Resnet-50 and Inception-V3 on sign language datasets.
  - **Developed a novel Recurrent Neural Network architecture** for sequence learning and **implemented an optimized version of the developed proof of concept using PyTorch**.

Projects

- **Data Augmentation using diffusion models** — Teaser Video [2023]
  - Used diffusion models to substitute image augmentations in the contrastive learning approach used in the paper SimCLR.
  - Increased Top-1 accuracy by 9 percent on the imagenet dataset along with better compute efficiency on training.
- **Stay Alive Think and Drive App** — GitHub [2023]
  - A web application which helps users to plan their journey by providing safety features based on past accident data, and live current weather conditions on the route.
  - The app has a React frontend and Mongo DB backend. Integrated with google maps API and weather APIs that work live with geolocation after the user inputs a travel route.
- **Reliable Answer Deduction** — Project page [2022]
  - Fine tuned BERT based LLMs and experimented with different attention mechanisms to develop a model which gives answers to the questions asked from a given comprehension.
- **Distributionally Robust Optimization** — Report [2022]
  - B.Tech research project; studied mathematical guarantees in making robust decisions under stochastic and adversarial paradigms.
  - Coded computationally tractable formulations using Wasserstein metric for classification applications to achieve better performance than standard scikit-learn functions.
- **Building an Assistant bot** [2021]
  - Worked on building a assistant bot in a national robotics competition. Implemented Monte carlo localization using point cloud mapping for autonomous navigation. Simulation Video
  - Used Octomap and trained a YOLO object detector model for automation of perceiving and picking trash objects using a robotic arm. Simulation Video
- **Trash Classification** — GitHub [2020]
  - Cleaned and augmented TACO trash dataset. Modified the convolutional layers of a lightweight SSD7 object detector.
  - The developed model is edge deployable and can identify and classify upto 7 different trash categories and outputs bounding boxes over all the instances of trash in an image.