Praneet Bomma

Machine Learning Engineer

Portfolio | GitHub | LinkedIn | Medium
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Education:

- **M.Sc. in Autonomous and Intelligent Systems**, University of Sheffield, UK [2022 - Present]
  - Developed a bash script to install the repast library with dependencies, helping the cohort avoid problems with setup.
  - Dockerized Repast for ease of accessibility and reproducibility for upcoming students taking the module.
  - Lead the team with the best simulation results in simulating the Anasazi model and achieved similar results to the previous best published and implemented in 2009.
  - Built a project with the industry on Reinforcement Learning in Additive Manufacturing.
- **B.E. in Computer Science**, Mumbai University, India, 7.23 CGPA [2015 - 2019]

Experience:

- **Research Assistant (Agent-Based Modelling)** at The University of Sheffield [March 2023 - May 2023]
  - Cleaned up simulation pipeline built in R removing redundancies and fixing bugs and bottlenecks in the pipeline.
  - Ported the microsimulation library initially built in R to Python3 and optimized the pipeline runtime by 2x.

- **Machine Learning Engineer** at DL Analytics [August 2021 - September 2022]
  - Developed end-to-end pipeline for Realtime Sports Video Analytics to process 12 4K streams with 5 models using Deepstream. Implemented post-processing for models with Libtorch and CUDA kernels for instance segmentation.
  - Vectorized pandas-based processing and optimized the processing by 8x to cut down the processing time from 2 hours to 15 minutes using cuDF.
  - Created data ingestion pipelines and built action detection on live video with XGBoost. Achieved 90%+ AUC score which helped cut down hours of manual work.
  - Developed data ingestion pipeline and a deep branched architecture from scratch with 3D Convolutions and LSTMs for Rain Attenuation Prediction on spatial and sensor data.

- **Data Scientist** at Blackstraw.ai [September 2019 - August 2021]
  - Enhanced entity extraction from invoices & receipts by implementing spatial and representation rules in addition to the language rules and improved accuracy by 20% from 70% to 90%+.
  - Built Facemask and Social Distancing violations detector using YOLOv3 with a team of 3 people for a Real-time Risk Monitoring Video Analytics system. Optimized model using TensorRT to achieve 2x speed throughput.
  - Automated deployment of ventilator software on Raspberry Pi in collaboration with PhDs from Stanford University and the University of Utah. Designed custom system services to automate the functioning of software components. Ensured Raspberry Pi's security for system integrity and failure handling.
  - Built Autonomous Navigation System for driving mini-trucks. Designed real-time instance segmentation using Yolact++. Developed novel architecture and designed Neural Path Planner to achieve intermediate waypoints independent of GPS. Optimized Occupancy Grid generation by 5x from 4FPS to 20FPS. Integrated all components and implemented inter-process communication between components using Robot Operating System (ROS).

- **Machine Learning Engineer** at Vidgyor Media Technologies [June 2019 - August 2019]
  - Restructured the entire pipeline by modularizing code, streamlining data retention, and standardizing ground rules for enhancements and maintenance.
  - Enhanced existing AD detection system and reduced false positives by improving pattern recognition techniques.
  - Engineered an end-to-end system to add new patterns and heuristic rules, test them instantly on live or saved streams, and release them instantly for the live system. Reduced the time taken for adding patterns, testing, and release from 2 days to 5 minutes with the new system.
  - Designed a PoC for audio fingerprinting for enhancing the existing AD Detection system.

Skills:

- **Development**: Python, C, C++, CUDA, SQL, Flask, Django, Redis, Kafka, MongoDB, ROS, Bash Scripting
- **Machine Learning and Deep Learning**: PyTorch, Tensorflow, Scikit Learn, OpenCV, NLTK, Libtorch, cuDF, HuggingFace, Deepstream, GStreamer, PyTorch Distributed
- **Deployment**: TensorRT, Triton, ONNX, OpenVINO, Docker, AWS

Projects:

- **MAFAT**
  Data Science competition by The Israeli Ministry of Defense and Directorate of Defense Research & Development (DDR&D) to classify whether a radar signal segment represents a human or an animal
  - Achieved Rank 23 globally on the competition public leaderboard with a 0.9028 ROC AUC score.
  - Implemented CRNN architecture from scratch for classification and worked with Focal Loss and Hyperparameter tuning to tackle class-imbalanced data issues.
  - Used ensemble technique to get the best score between 2 well-performing trained architectures and tested transformers for improving the AUC score.

- **ReLIE - Paper Implementation**
  Implemented paper by Google Research - Representation Learning for Information Extraction from Form-like Documents - Link to paper
  - Built the neural network described in the paper from scratch and filled up the gaps/unknown things left out in the paper during implementation
  - Used a publicly available dataset in addition to the self-annotated dataset.
  - Improved results by using Focal Loss for imbalanced data.

Certifications:

- Deep Learning Specialisation on Coursera

Publications & Blogs:

- “Disorder Detection of Tomato Plant using IoT & Ensemble Techniques” AFITA conference at IIT Bombay, Maharashtra, India. Link to paper.
- Indian Financial Markets in Pandemic - Open Report
- Visualization of LSTM Activations in Keras - Towards Data Science
- Distributed Training in PyTorch - Analytics Vidhya
- Real-time Object Detection on CPU - Towards Data Science

Achievements:

- **23rd Globally** in the MAFAT Challenge, organized by The Israeli Ministry of Defence. Only 25 teams out of 300 achieved an AUC score above 0.90.
- **Outstanding Performer** for Q2, Q3 - 2020 & Q1 - 2021 in Blackstraw.ai
- Qualified for **Grand Finale** of Smart India National Level Hackathon, 2018
- **1st Runner-Up** in KJSCE State Level Hackathon, India, 2017
- **1st Runner-Up** in ITSA State Level Hackathon, India, 2017

Extra Activities:

- Head of the committee named Programmers’ Club for 2 years during UG degree
- Lead Organizer of ERR_404 2.0 State Level Hackathon during UG degree