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 - 2023)
  - Developed a bash script for easy Repast library installation, enhancing setup efficiency for the cohort.
  - Dockerized Repast for ease of accessibility and reproducibility for future students taking the module.
  - Led a team that achieved the best simulation results among the cohort while simulating the Anasazi model. Successfully matched the outcomes of the previously best-published results, originally implemented in 2009.
  - Led an industry project focused on leveraging Reinforcement Learning techniques in Additive Manufacturing.
  - Completed dissertation research in the domain of Deep Learning with a focus on Explainable AI for Cancer Cells.
- **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)
  - Refined simulation pipeline in R by eliminating redundancies, resolving bugs, and enhancing overall performance.
  - Efficiently migrated simulation library from R to Python3 and accelerated pipeline runtime by 2x with vectorization.

- **Machine Learning Engineer** at DL Analytics (August 2021 - September 2022)
  - Orchestrated an end-to-end Realtime Sports Video Analytics pipeline, efficiently processing 12 4K streams with 5 models using Deepstream. Leveraged Libtorch and CUDA kernels for instance segmentation post-processing.
  - Enhanced processing efficiency by 8x through vectorization of pandas-based operations and cuDF optimization. Reduced processing time from 2 hours to 15 minutes.
  - Initiated the development of data ingestion pipelines and implemented action detection on live video using XGBoost. Achieved 90%+ AUC score and automated hours of manual work.
  - Developed data ingestion pipeline and a deep branched architecture from scratch, integrating 3D Convolutions and LSTMs for Rain Attenuation Prediction on spatial and sensor data.

- **Data Scientist** at Blackstraw.ai (September 2019 - August 2021)
  - Implemented advanced spatial and representation rules to enhance entity extraction accuracy from invoices & receipts. Successfully improved accuracy from 70% to over 90%, marking a 20% increase.
  - Worked with a team of 3 to develop a Real-time Risk Monitoring Video Analytics system using YOLOv3 and optimized the model with TensorRT, achieving a 2x speed throughput. Streamlined CI/CD with Jenkins for 40 cameras.
  - Automated deployment of ventilator software on Raspberry Pi, in partnership with PhDs from Stanford University and the University of Utah. Designed custom system services for automating software components and implemented robust security measures for system integrity and failure handling.
  - Developed Autonomous Navigation System for mini-trucks. Designed real-time instance segmentation using Yolact++, and crafted a novel Neural Path Planner for achieving intermediate waypoints independent of GPS. Achieved 5x optimization in Occupancy Grid generation, increasing the speed from 4FPS to 20FPS. Integrated all components and established seamless inter-process communication using Robot Operating System (ROS).

- **Machine Learning Engineer** at Vidgyor Media Technologies (June 2019 - August 2019)
  - Revamped the entire pipeline by implementing modular code structures, optimizing data retention practices, and establishing standardized protocols for future improvements and maintenance.
  - Enhanced existing AD detection system and reduced false positives by improving pattern recognition techniques.
  - Engineered an end-to-end system to expedite the process of adding new patterns and heuristic rules. Enabled instant testing on live or saved streams and facilitated rapid releases to the live system. Reduced the pattern addition, testing, and release time from 2 days to just 5 minutes with the implementation of this new system.
  - Developed a Proof of Concept (PoC) for audio fingerprinting, aimed at 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
  - Attained 23rd rank globally on the competition public leaderboard, showcasing a 0.9028 ROC AUC score.
  - Developed a CRNN architecture from the ground up for classification tasks, effectively addressing class-imbalanced data challenges through the use of Focal Loss and Hyperparameter tuning.
  - Employed an ensemble technique to optimize performance by selecting the superior score between two well-performing trained architectures. Additionally, explored the potential of transformers to enhance the AUC score.

- **ReLIE - Paper Implementation**
  Implemented paper by Google Research - Representation Learning for Information Extraction from Form-like Documents - Link to paper
  - Constructed the neural network outlined in the paper from scratch, addressing gaps and unknown elements that were omitted in the paper's implementation.
  - Incorporated a self-annotated dataset alongside a publicly available dataset to enrich the training process and enhance model performance.
  - Successfully enhanced results by effectively applying Focal Loss to handle imbalanced data challenges.

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:

- **Ranked 23rd Globally** in the prestigious MAFAT Challenge, hosted by The Israeli Ministry of Defense. Distinguished as one of the top 25 teams out of 300 with an exceptional AUC score surpassing 0.90.
- Recognized as an **Outstanding Performer** for Q2, Q3 - 2020 & Q1 - 2021 at Blackstraw.ai.
- Qualified for the **Grand Finale** of the esteemed Smart India National Level Hackathon in 2018.
- Achieved **1st Runner-Up** position in the KJSCE State Level Hackathon, India, in 2017.
- Secured **1st Runner-Up** position in the ITSA State Level Hackathon, India, in 2017.

Extra Activities:

- Served as Head of the Programmers' Club committee for the final 2 years of my undergraduate degree.
- Successfully led as the Organizer of ERR_404 2.0, a highly acclaimed State Level Hackathon, during my undergraduate degree.