

FULL STACK DATA SCIENTIST/MACHINE LEARNING ENGINEER

PROFESSIONAL SUMMARY

- Accomplished **Machine Learning Engineer** with extensive experience in designing and implementing advanced neural network architectures
- Proven track record in developing state-of-the-art systems for multi-modal 3D Perception and Natural Language understanding and generation tasks
- Expertise in integrating cutting-edge technologies such as **Vision Transformers, Large Language Models, multimodal data fusion, and CUDA-based parallel computing**
- Demonstrated success in optimizing computational algorithms and deploying scalable solutions on cloud (**AWS,GCP**) using containerization tools (**Docker, Kubernetes**)
- Proven ability to curate large datasets, optimize model training, and improve model performance through quantization and high-performance computing methods

CORE COMPETENCIES

- Deep Learning
- Computer Vision
- Natural Language Processing (NLP)
- Data Curation & Pre-processing
- Model Optimization
- Cloud Computing & Deployment
- Continuous Integration/ Continuous Deployment (CI/CD)
- Technical Communication

KEY RESULT AREAS

- Model Development:** Designing, implementing, and optimizing deep learning models for both computer vision and natural language tasks
- Data Preparation:** Pre-processing and curating large datasets for training and evaluation
- Algorithm Research:** Staying up-to-date with the latest research in deep learning, and applying novel techniques to improve model performance
- Deployment:** Developing and maintaining scalable solutions for deploying ML models in production environments
- Evaluation:** Conducting rigorous testing and evaluation of ML models, using metrics to ensure accuracy, robustness, and fairness
- Documentation:** Documenting model architecture, training processes, and evaluating results to ensure reproducibility and knowledge sharing within the team

EDUCATION

- M.Sc. (Computer Science)** from Technische Universität München, Munich, Germany

2024
- Thesis: Advancing 3D Object Tracking: Deep Neural Network Framework for Re-Identification and Motion Estimation using Radar, Camera

Thesis submitted to BMVC (British Machine Vision Conference) 2024
- B.E. (Instrumentation and Control- Minor in Electronics and Robotics)** from University of Delhi, New Delhi, India

2021
- Thesis: [Comparative Analysis of Intelligent Classifiers for Seizure Detection Using EEG Signals](#), published at ICACIT 2021

PROFESSIONAL EXPERIENCE

- NXP Semiconductors, Hamburg, Germany**

Sep 2024 - Present

Machine Learning Engineer

 - Developing radar-based 3D Computer Vision scene understanding Machine Learning models for NXP, implementing low-latency, hardware-aware multi-modal (Camera + Radar FFT signal maps) vision transformer model that includes a 5x5x5 (voxel) neighborhood feature extractor for detecting static and dynamic targets, class information, and Instance IDs. Real-time radar processing streamlined on ARM-based processors using ARM Compute Library, OpenCL, and TVM, achieving efficient and high-performance radar scene understanding
 - Designed a transformer-driven radar encoder to extract rich spatial features from Range-Doppler maps in Bird’s Eye View (BEV) space. Leveraged multi-head self-attention for spatial encoding and cross-attention for radar–camera fusion, significantly advancing perception performance in ADAS (Advanced Driver-Assistance Systems)
 - Optimized ML workflows for large-scale edge deployment on NXP’s ADAS testbed using PyTorch, TensorFlow XLA, ATen ops, and CUDA, ensuring real-time performance under hardware constraints. Gained exposure to NeutronX accelerator and numerical SW/HW co-design for efficient on-vehicle inference
 - Collaborating with silicon and cross-functional teams across timezones (US & Europe) to align various machine learning architectures with NXP hardware for robust, real-time multi-sensor applications
 - Supporting patent applications related to radar transformer models and multi-sensor fusion technologies, reinforcing NXP's position in advanced autonomous sensor perception solutions for autonomous vehicle applications
- MAN Truck & Bus SE, Munich, Germany**

May 2023 - Jul 2024

Perception Developer

 - Utilized CUDA-based parallel computing to accelerate real-time sensory data processing, object detection and implemented high-performance computing techniques to enhance multimodal perception software stack (Camera, Radar)
 - Achieved robust depth estimation by developing a low-latency, high-frequency Convolutional Neural Network (CNN) architecture tailored for exploiting camera images and weak radar supervision

- Achieved a 20% reduction in data processing time by employing GPU programming and distributed computing frameworks (Apache Spark) to optimise computational algorithms for 3D perception tasks
- Ensured scalable deployment by enhancing system performance through high-performance computing environments, including parallel computing, cloud-based computing (AWS), and containers (Docker, Kubernetes)
- Supported the rapid analysis of large datasets by engineering a cohesive data ecosystem by integrating SQL and NoSQL databases for efficient data storage and retrieval
- Demonstrated the effectiveness of the approach on the nuScenes dataset (>1TB) by surpassing state-of-the-art baselines by an impressive 2% margin
- Integrated the proposed neural network module into the perception stack's feature backbone
- Optimized deployment pipelines using TensorRT and C++, by implementing comprehensive code reviews and rigorous testing procedures to ensure high reliability and performance

CONVAISE A.G, Munich, Germany

May 2022 - Sep 2022

Natural Language Processing Researcher

- Developed a novel NLP model using Bayesian inference for sentence clause separation in English and German, tailored for tax and financial auditing software
- Achieved a 15% improvement in sentence parsing accuracy by combining the latest research in Text Simplification and Open Information Extraction with the T5 transformer and a novel decoder architecture
- Utilized advanced data pre-processing and augmentation techniques (Hadoop MapReduce and Back-Translation) to optimise model training
- Achieved a 30% reduction in model size and 25% increase in inference speed by implementing model quantization with the ONNX framework
- Performed extensive unit and load testing to ensure seamless and efficient system operations by deploying the solution code stack to Google Cloud Platform using Docker containers and Kubernetes

TECHNICAL SKILLS

Languages:	Python, C++, R, JavaScript, MATLAB, Java, ROS 2, SQL
Tools and Frameworks:	PyTorch, Hugging Face, Keras, OpenCV, SpaCy, JAX, CUDA, ONNX, Apache Spark, Hadoop
Operating Systems:	Linux, Microsoft Windows, Ubuntu
Deployment Tools and Version Control:	Git, Docker, Kubernetes, FastAPI, TensorRT
Cloud:	GCP, AWS S3, AWS EC2
Networks and Approaches:	CNN, Vision Transformers, PointNet++, MLPs, LLMs, LSTMs

ACCOLADES

- Bagged a merit certificate from the Ministry of Education for achieving 96.4% in A-level exams and achieved rank in the top 5 percentile of Haryana
- Graduated as valedictorian and was elected student council representative at the University of Delhi
- Volunteered as a Math Tutor for Ukrainian and Syrian refugee children in München Landeshauptstadt

PUBLICATIONS

- Singh, A., Basak, D., Das, U., Chugh, P., & Yadav, J. (2022). A Comparative Analysis of Intelligent Classifiers for Seizure Detection Using EEG Signals. In Advanced Computing and Intelligent Technologies: Proceedings of ICACIT 2021 (pp. 577-591). Springer Singapore
- Basak, D., Wolters, P., & Rigoll, G., Prof. Dr. (2024). Advancing 3D Object Tracking: A Deep Neural Network Framework for Re-Identification and Motion Estimation using Radar and Camera [Master's Thesis, Technical University of Munich]

PROJECTS UNDERTAKEN

Project:	Segment Anything NeRF
Description:	Developed a 3D segmentation pipeline integrating Segment Anything and NeRF, enabling view-consistent object locking using language and point prompts. Optimized mask quality via patch-based rendering and reduced encoding time by 10% with volumetric image encoding.
Project:	LLM-ConvRec
Description:	Built a prompt-based conversational system using LLMs with dynamic recommendation updates from user input. Enhanced response quality with late attention fusion and improved text generation speed by 8% while preserving contextual relevance.
Project:	Intrusion Detection System
Description:	A LoRa-based Raspberry Pi alarm system for intrusion detection using door/window sensors and a Telegram bot for real-time alerts. Designed a transmitter–receiver–server architecture with FastAPI backend, Postgres DB, and Grafana dashboard for state monitoring and control.

PERSONAL DETAILS

Languages Known:	English (C1), German (B2), Dutch (B1), Hindi (C1), Bengali (C1)	Date of Birth:	15.11.1999
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