Shubham Kumar

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Education

Master of Science, Computer Science — **ETH Zürich**
CGPA: 5.5/6 | *Major: Machine Learning, Minor: Data Management* — *September 2021 - June 2024*
Relevant Coursework: Probabilistic Artificial Intelligence, Big Data, Natural Language Processing for Law and Social Science, Advanced Machine Learning, Machine Perception, Computational Intelligence Lab

Bachelor of Technology, Electrical Engineering — **IIT Roorkee**
CGPA: 9.33/10 — *July 2014 - May 2018*
Relevant Coursework: Design and Analysis of Algorithms, Programming in C++, Operating Systems

Work Experience

Ucentrics AG — **Zürich, Switzerland**
Machine Learning Engineer — *September 2024 - Present*
- Developed and integrated AI capabilities into Ucentrics' core application, including scene understanding, anomaly detection, and multi-modal data processing for industrial inspection and workforce guidance.
- Independently developed and implemented a novel model and inference pipeline from scratch in just **3 months**, enabling efficient overlay estimation on low-compute devices. **Outperformed industry leader Vuforia**, saving clients 30,000 CHF in licensing costs. (ONNX / PyTorch / C++ / Python)
- Built a synthetic data pipeline that reduced manual annotation efforts by **80%**, significantly lowering annotation costs and improving the robustness of computer vision models.

ETH Zürich, Product Development Group — **Zürich, Switzerland**
Research Assistant — *December 2023 - May 2024*
- Developed and deployed efficient scene inspection models optimized for real-time mobile device inference, enhancing AR capabilities and reducing computational load.
- Implemented smart 3D overlay models for augmented reality (AR) features.

Disney Research | Studios — **Zürich, Switzerland**
Master's Thesis Student (Design and Training of Efficient Transformer Networks) — *March 2023 - September 2023*
- Created a processing pipeline enabling large-scale architecture search, experiment tracking, and reporting (**500+ runs**).
- Developed a network with **linear** computational & memory complexity in the number of tokens (points), reducing the mean reconstruction error of 3D-hand shapes by 10.3% while being **31.5% more computationally efficient.**

Oracle Cloud AI Services — **Bengaluru, India**
Member of Technical Staff — *October 2020 - September 2021*
- Developed, trained, and productionized **Deep Learning** models for aspect-based sentiment analysis (ABSA) service, ensuring efficient implementation and high prediction quality (F1 **86.8%**). (PyTorch / ONNX / CUDA)
- Created **validation and benchmarking** agent, allowing easy registration of datasets, tasks, and metrics to generate customized and detailed performance summaries of the models for model selection.
- Created template processor for **synthetic text data** generation and pipeline for supporting **data annotation** and conflict resolution, which enabled a **4.5** times increase in high-quality in-house annotated data volume.

Oracle Applications Lab — **Bengaluru, India**
Software Engineer — *July 2018 - September 2020*
- Designed and implemented **data aggregation API** for the supply chain dashboard, enabling the support team to quickly identify and resolve customer issues, improving turnaround time by **30%**. (Java / Spring Boot / JDBC)
- Implemented **backend and intent resolution flow** for a chatbot application which enabled users to **quickly query** shipping details via messengers like **Slack & Facebook**. (Node.js)
- Created a **web service** for dynamic pricing of pre-install softwares based on configurable rules. (Java / Spring Boot)
- Actively contributed to the requirement-gathering process and formulating **development plans** in collaboration with other teams (Costing, Inventory, and B2B).

Research Publications

InfiNet: Fully Convolutional Networks for Infant Brain MRI Segmentation, *2018 IEEE 15th International Symposium on Biomedical Imaging (ISBI 2018)*, Washington, DC, 2018, pp. 145-148.
Learning Optimal Deep Projection of ^{18}F-FDG PET Imaging for Early Differential Diagnosis of Parkinsonian Syndromes, *Deep Learning in Medical Image Analysis 2018, ML-CDS 2018, Granada, Spain.*

Technical Skills

Programming Languages:	Python, C++, Java, JavaScript
Libraries/Frameworks:	PyTorch, Numpy, scikit-learn, PyBind, pytest | FastAPI, Flask, Gunicorn, Spring Boot | NLTK, spaCy, Hugging Face, LangChain
Tools & Technologies:	Docker, Git, ONNX, Slurm, Jenkins, Grafana, PostgreSQL, Oracle
Software Development:	Design Patterns, Unit Testing, CI/CD
AI:	Transformers, CNN, VAE, GAN, Normalizing Flows, Linear Algebra
Certifications :	Scaled Agile Framework (SAFe 4) Practitioner

Selected Projects

Extracting Respiratory Rate with Uncertainty Estimates from PPG Using Probabilistic Deep Neural Networks
SIPLAB, ETH Zürich *October 2022 - December 2022*
Utilized **contrastive learning** to leverage unannotated signals, and developed a Deep Learning model in 'Mean Variance Estimation' setting, improving the MAE on the BIDMC respiratory dataset by **21%** (0.74 *breaths/min*) compared to the previous method, and also providing a **reliability estimate**.

PubMed Document Analysis
Machine Learning for Healthcare, ETH Zürich *April 2022*
Processed PubMed 200k RCT corpus, trained a Word2Vec embedding model, and used this along with a fully-connected network for classifying medical texts, achieving an F1 score of **84.29%**.

Road Segmentation
Computational Intelligence Lab, ETH Zürich *March 2022 - April 2022*
Developed a ResNet backbone-based aerial image segmentation pipeline for delineating road and background pixels, achieving an F1 of **89.9%**.

TXN - Stock Monitoring
Personal *April 2021 - May 2021*
Created a stock monitoring tool that can notify users of stock price changes and complex price trends as they occur. It is built on top of Zerodha's stock trading API.

Awards / Scholarships

- Institute Best Project Award 2017-18, IIT Roorkee
- DAAD-WISE scholarship by the German Academic Exchange Service, 2017
- Selected for the Viterbi-India Program 2017 (University of Southern California, USA).
- CBSE Merit Scholarship - 2014

Additional Information

Languages: English (Fluent), Hindi (Native)

References

- Dr. Tunç O. Aydin, Research Scientist at Disney Research, Zürich : tunc@disneyresearch.com
- Mr. Nagaraj Bhat, Staff Machine Learning Engineer, ServiceNow, Bengaluru: nagaraj.bhat@servicenow.com
- Dr. Sailesh Conjeti, Global Product Lead - AI at Olympus Europa SE, Hamburg : sailesh.conjeti@olympus.com