

Venkatesh Thirugnana Sambandham

DATA SCIENTIST/AI ENGINEER

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Summary

M.Sc. Digital Engineering graduate specializing in AI, Machine Learning, and Deep Learning, boasting over three years of hands-on experience in real-time projects. My Expertise spans Data-Driven Modeling techniques with a focus on knowledge extraction. I am proficient in Geospatial data, Medical Imaging, and Autonomous Vehicle technologies. I am eager to tackle new, complex application challenges and benefit from data-driven, uncertainty-aware learning.

Skills

Programming	Python, JAVA	Plotting, Visualization	Matplotlib, Plotly-Dash, Folium
Data Science packages	Numpy, Xarray, Pandas, Scikit-Learn, shapley	Remote Sensing	STAC, Geopandas, Rasterio, QGIS
Deep Learning Frameworks	Pytorch, Tensorflow, Keras	Deep Learning Inferencing	Tensorboard, WANDB
Others	TeX	Dev. Tools	Git, AWS S3, AWS EC2

Work Experience

Otto Von Guericke University

Magdeburg, Deutschland

RESEARCH ASSISTANT - CHAIR OF SOFTWARE ENGINEERING

Sep. 2022 - Now

- **safeTrAln Project** : Spearheaded the development of pioneering solutions to ensure the safety of ML-based rail vehicles. Led efforts in Operation Design Domain (ODD) coverage testing and model validation, guaranteeing robust performance across diverse operational scenarios.
- Conducted comprehensive literature reviews and implemented state-of-the-art (SOTA) Uncertainty Quantification techniques for Deep Learning systems.
- Supervised Master Thesis and seminars on Machine Learning Safety topics.

BASF Digital Farming GmbH

Köln, Deutschland

MASTER THESIS STUDENT - REMOTE SENSING DATA SCIENCE - Master Thesis Grade - 1.0

Oct. 2021 - May. 2022

- Designed and implemented an inter-sensor harmonization pipeline to minimize spectral differences among images sourced from various satellite platforms.
- Utilized Deep Learning-based Generative Models (CNN) to tackle image Super-Resolution tasks, enhancing image quality and detail.
- Developed an End-to-End pipeline encompassing data acquisition, preprocessing of Remote Sensing data, training of CNN-based image reconstruction models, and evaluation and inference modules.
- Achieved approximately a 5% enhancement in structural similarity and spectral consistency compared to conventional techniques, demonstrating the efficacy of the proposed pipeline.

WORKING STUDENT - DATA SCIENCE

Mar. 2021 - Sep. 2021

- Conducted in-depth research focused on developing a Data-Driven Crop Disease Modeling system aimed at early detection of crop diseases.
- Analyzed diverse datasets from multiple sources, including Remote Sensing, meteorological data, and phenology-based features to identify early-stage crop stress.
- Developed an Explainable Machine Learning (ML) framework and accompanying visualization tools to track the progression of various features over time. This facilitated the identification of key parameters associated with crop diseases.
- Successfully implemented a robust pipeline capable of detecting the onset of diseases at very early stages, showcasing the effectiveness of the developed approach.

DATA SCIENCE INTERN

Dec. 2020 - Feb. 2021

- Engineered and developed a comprehensive pre-processing pipeline to construct datasets essential for training Data-Driven Disease Prediction models.
- Conducted meticulous analysis and data cleaning procedures, including rigorous temporal and geo-spatial sanity checks, ensuring the quality and reliability of the generated dataset.
- Applied advanced feature engineering techniques using diverse Machine Learning frameworks, such as Gradient Boosting, Ensembled Tree Learning, LSTM models, and other multivariate time series frameworks.

Education

Otto von Guericke University, M.Sc Digital Engineering

Grade : 2.0

2019 - 2022

Magdeburg,
Germany

Mepco Schlenk Engineering College, B.E Major in Mechanical Engineering

Grade : 1.9

2013 - 2017

Sivakasi, India

Projects

Deep Learning based Super-Resolution of 3D Magnetic Resonance Images

Magdeburg, Germany

MR IMAGES - SUPER RESOLUTION | INTER-DISCIPLINARY TEAM PROJECT |  GITHUB

Aug. 2020 - Sept. 2021

- Conducted extensive literature review on Single-Image and MRI super-resolution techniques, informing research direction.
- Developed and evaluated advanced architectures for 3D MRI super-resolution, demonstrating expertise in image processing.
- Implemented scalable training framework and explored novel uncertainty quantification methods, contributing to robust model development and leadership in team projects.

Publications

Evaluating and Increasing Segmentation robustness in CARLA

Workshop Paper

- Robustness testing of Semantic Segmentation models in adverse weather conditions.
- Status : Published and presented at Workshop on AI Safety (WAISE23) @safecomp23.
- DOI: [Click Here](#)

Towards Transformer-based Homogenization of Satellite Imagery for Landsat-8 and Sentinel-2

Workshop Paper

- Developed a Vision Transformer-based super resolution approach for satellite image homogenization.
- Presented the approach at ESST2022 - Transformers Workshop for Environmental Science.
- DOI: [Click Here](#)

Early Onset Yellow Rust Detection Guided By Remote Sensing Indices

Journal Article

- Contributed as a primary author for a peer-reviewed research article on Data-Driven Disease Modeling during tenure at BASF Digital Farming GmbH.
- Article successfully underwent peer review and has been published.
- DOI: [Click Here](#)

Uncertainty quantification for ground-truth free evaluation of deep learning reconstructions

Conference Paper

- Contributed to a conference paper focusing on uncertainty quantification for ground-truth-free evaluation of deep learning reconstruction
- Presented the paper at the ISMRM - ESMRMB Conference 2022 in London, UK.
- Full-Text Link : [Click Here](#)