

Trushal Sardhara

Machine Learning Researcher (Dr.-Ing.)

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RG ResearchGate 🏠 Google Scholar in LinkedIn

ABOUT ME

Specialist in computational imaging for electron microscopy. Certified with Microsoft Azure ML, my interest lies in developing and deploying impactful real-world ML applications focused on areas of robotics, medicine and microscopy

PROFESSIONAL EXPERIENCE

03.2024 – present
Aachen, Germany

Scientific Researcher (Wissenschaftlicher Angestellter),
Uniklinik RWTH Aachen 🔗

- Generated an accurate segmentation pipeline for MR images using a very small dataset to track progressive changes in rare disease patients
- Realistic MRI synthetic data pipeline for rare diseases using machine learning

02.2021 – 03.2024
Hamburg, Germany

Scientific Researcher (Wissenschaftlicher Mitarbeiter),
Institute of Continuum and Materials Mechanics, Technische Universität Hamburg 🔗

- Generated synthetic electron microscopy images using Monte Carlo simulations for ML models
- Developed end-to-end data and ML pipeline for 3D reconstruction of nanomaterials increasing accuracy by 90%
- Designed and implemented multi-modal ML combined with domain adaptation techniques to improve image segmentation further by 20%
- Developed novel isotropy based metric to measure segmentation performance for data without ground-truth

10.2019 – 02.2021
Hamburg, Germany

Machine Learning Engineer (Part-time), *Obungi GmbH* 🔗

- Completed 5 projects successfully in the areas of natural language processing, time-series analysis, survival analysis, customer churn prediction and IoT using Azure ML
- Developed automatic framework to train and deploy models on Azure ML
- Trained BERT for product label classification (2200+ labels) task achieving 92% accuracy

12.2018 – 09.2019
Hamburg, Germany

Student Assistant (Software Developer), *Electron Microscopy Unit (BEEM), Technische Universität Hamburg* 🔗

- Developed microscope renting management portal (BASE) using PHP and MySQL

08.2016 – 06.2018
Surat, India

Full Stack Software Developer, *Caliente iTech* 🔗

- Delivered and managed more than 15 projects including dedicated ERP Systems and blockchain applications using Python, PHP, MySQL, Unity and C#






EDUCATION

02.2021 – 08.2024 Hamburg, Germany	Doctor of Engineering (Dr.-Ing.) , Technische Universität Hamburg Focus: Machine Learning (supervised and self-supervised), Multimodal ML, Domain adaptation, Generative models
10.2018 – 01.2021 Hamburg, Germany	M. Sc. (Mechatronics) , Technische Universität Hamburg (Specialization: Intelligent Systems and Robotics) Major Subjects: Intelligent Systems in Medicine, Machine Learning and Data Mining
06.2012 – 05.2016 Gujarat, India	B.E. (Mechatronics) , Gujarat Technological University Major Subjects: Machine Vision, Micro-processors & Micro-controllers, Mathematics

SKILLS

Project Management, Python, PyTorch, C++, Convolutional Neural Networks, Azure ML, Machine Vision, Strong Presentation and Communication, Matlab, Image Processing

PUBLICATIONS

01.2024	Sardhara, Trushal, et al. "Enhancing 3D reconstruction accuracy of FIB tomography data using multi-voltage images and multimodal machine learning", DOI: https://doi.org/10.15480/882.8927, Nanomanufacturing and metrology 
10.2023	Sardhara, Trushal, et al. "Role of slice thickness quantification in the 3D reconstruction of FIB tomography data of nanoporous materials", DOI: doi.org/10.1016/j.ultramic.2023.113878, Ultramicroscopy 
07.2023	Sardhara, Trushal, et al. "Towards an Accurate 3D Reconstruction of Nano-porous Structures using FIB Tomography and Monte Carlo Simulations with Machine Learning", DOI: 10.1093/micmic/ozad067.257, Microscopy and Microanalysis 
02.2022	Sardhara, Trushal, et al. "Training deep neural networks to reconstruct nanoporous structures from FIB tomography images using synthetic training data", DOI: 10.3389/fmats.2022.837006, Frontiers In Materials 
03.2017	Sardhara, Trushal, and Ketan Tamboli. "Design and development of automatic lubrication system for ATC of CNC", DOI: https://doi.org/10.1016/j.matpr.2017.11.653, Materials Today: Proceedings 


CONFERENCES

02.2023 Darmstadt, Germany	Talk: 3D reconstruction of hierarchical nanoporous structures using multi-modal deep learning models trained on synthetic multi-voltage FIB tomography data, Microscopy Conference (MC2023)
07.2022 Leoben, Austria	Poster: 3D reconstruction of hierarchical nanoporous gold from FIB tomography data using deep neural networks, Hybrid 2022: Materials and Structures

PROJECTS

- 01.2020 – 01.2021 **Semantic segmentation of nanoporous FIB tomography data using artificial intelligence**, *Project work and Master thesis*
- Generated synthetic binary hierarchical nanoporous gold structures and simulated them using MC Xray Dragonfly Python API
 - Trained machine learning models using synthetic images for semantic segmentation tasks achieving 98% accuracy
 - Implemented sensor fusion technique for electron microscopy data
- 03.2020 – 07.2020 **Coready! – Social distancing and social bubble application**, *Non-profit COVID-19 project (social welfare)*
- Formed and led a team of 5 volunteer mobile app developers
 - Developed the backend of a mobile application in Python that helped maintain social distancing, contact tracing and predicting COVID symptoms effectively using statistics and improved them with AI
- 10.2019 – 03.2020 **Skin lesion analysis for Melanoma detection using deep learning**
- Implemented a classifier for skin lesion detection with 8 known and 1 unknown class using classical machine learning and improved its performance by 30% by adapting deep learning (ISIC 2019 Challenge Data)
- 04.2019 – 09.2019 **Image guided robotic transcranial magnetic stimulation**
- Calibrated extrinsic and intrinsic parameters of RGBD camera using OpenCV and Python
 - Developed a motion compensation system using ROS/Python by tracking the patient's head position with the RGBD camera and moving a coil attached to UR5 robot accordingly

ACHIEVEMENTS

- 08.2020 **Coready! Non-profit project featured on IEEE**
<https://spectrum.ieee.org/social-distancing-heres-an-app-for-that> 
- 03.2020 **Philips Europe TechXperience Challenge 2020 (Secured 1st Position)**
- Object recognition using deep learning to help detect diseases faster
 - Detection among 4 Philips products using only 64 images per product

LANGUAGES

English, German, Gujarati, Hindi