

Dhruv Makwana

COMPUTER VISION ENGINEER · DEEP LEARNING RESEARCHER

Ahmedabad, Gujarat, India

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Experience

INDUSTRY EXPERIENCE

Ignitarium Technology Solutions

Bengaluru, India

AI ENGINEER

Dec. 2021 - present

- Developed and implemented high-performance computation kernels, reducing system latency in data transformations and computer vision tasks, improving processing speeds, and enhancing system efficiency.
- Implemented a custom lightweight model for face detection and age and gender classification, achieving a notable 94 % accuracy on the Asian faces dataset for edge deployment.
- Designed a prototype solution for fault diagnosis from machinery sensor signal data, achieving 98 % accuracy for fault classification utilizing Fourier and wavelet-based noise reduction and LSTM and dilated convolution layers.
- Developed 6DoF pose estimation pipeline for small objects using object detection from YOLOv8 and pose estimation from megapose and templatepose.

Qualitas Technologies

Bengaluru, India

MACHINE LEARNING ENGINEER

Sept. 2020 - Nov. 2021

- Developed and implemented Faster RCNN and SSD-based object detection pipeline achieving more than 95% mAP score for chassis number detection.
- Designed detection and segmentation solutions with 4% faster inference utilizing optimization techniques like tensorRT, OpenVINO, mixed precision, and quantization.
- Collaborated with research teams to develop automatic image labeling through active learning, enhancing efficiency in data labeling processes and significantly reducing costs and manual efforts.

RESEARCH EXPERIENCE

IIT Roorkee CANDLE Research Lab

With Dr. Sparsh Mittal

RESEARCH INTERN

Nov. 2021 - present

- Worked on **PCB component detection and segmentation for recycling** and **low light image enhancement** as the lead researcher and first author, **Text removal from scene images** and **PCB Component classification** as second author, and **Global Fourier self-attention for multimodal downstream tasks**. and **Nuclei instance segmentation for histopathological diagnosis** as the third author.
- Defined research problem, identified past research works and their drawbacks, implemented custom modules to mitigate those drawbacks in the proposed method, ran the experiments on large scale FICS PCB dataset for **PCB Component detection and segmentation** project and on LOLv1, LOLv2, DICM, LIME, MEF, NPE and VV datasets for **Low light image enhancement** Project.
- Worked on experiments and data processing to train and evaluate different methods on FICS PCB dataset for **PCB Component classification** project and on SCUT8k, SCUT-EnsText, and Oxford scene text dataset for **Text removal from scene images** project.
- Performed experiments on previous methods and contributed to data processing and post-processing of proposed method for **Global Fourier self-attention for Multimodal downstream tasks** project and **Nuclei instance segmentation** project.
- Contributed to writing different paper modules and preparing possible reviewer questions to strengthen the paper.

IIT Hyderabad VIGIL Lab

with Dr. C. Krishna Mohan

RESEARCH INTERN

Jan. 2022 - June 2022

- Worked on **Semiconductor wafer map segmentation and classification** project as second author and **Remote sensing cloud segmentation** project as lead researcher and first author.
- Collected challenges of remote sensing images faced by clouds in the sky. Created problem statement of identifying a cloudy region in the image efficiently using a combination of traditional machine learning and deep learning techniques for **Remote sensing cloud segmentation** project.
- Worked with another graduate student on a **semiconductor project**. Created synthetic data for segmentation using image processing algorithms. Contributed to creating a shared weights single network for performing classification and segmentation. Additionally, I ran experiments and evaluations of different metrics on current and previous methods.

AI Institute of UofSC

with Dr. Amit Sheth

RESEARCH INTERN

June 2023 - Present

- Working on **Explainable Food Recommendation Model** project.
- Working on multimodal knowledge infusion for food image to recipe text retrieval by retraining a state-of-the-art food retrieval system with a proposed recipe similarity loss.
- Identified and curated recipe data and nutritional information for recipes suitable for diabetic patients through web crawling.
- Utilized LLM APIs like ChatGPT, OpenLLaMA, etc., to segregate ingredients and volume to be analyzed for disease context.
- Worked on USDA APIs to collect ingredient categories for every ingredient utilized in graph models. For example, the category for tomato is vegetable.

Publications

LIVENet: A novel network for real-world low-light image denoising and enhancement in <i>IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)</i>	2024
Textual Alchemy: CoFormer for Scene Text Understanding in <i>IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)</i>	2024
PCBSegClassNet — A light-weight network for segmentation and classification of PCB component in <i>Elsevier Expert Systems with Applications</i>	2023
TPFNet: A Novel Text Inpainting Transformer For Text Removal in <i>International Conference on Document Analysis and Recognition (ICDAR)</i>	2023
GAFNet: A Global Fourier Self Attention Based Novel Network for multi-modal downstream Tasks in <i>IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)</i>	2023
ACLNet: an attention and clustering-based cloud segmentation network in <i>Taylor & Francis Remote Sensing Letters</i>	2022
WaferSegClassNet - A light-weight network for classification and segmentation of semiconductor wafer defects in <i>Elsevier Computers in Industry</i>	2022
FEEDNet: A Feature Enhanced Encoder-Decoder LSTM Network for Nuclei Instance Segmentation for Histopathological Diagnosis in <i>IOP Physics in Medicine & Biology</i>	2022

Skills

Programming Languages	Python, C, C++, Cuda
DL Frameworks	TensorFlow, PyTorch, Keras, ONNX, Hugging Face
Mathematics	Linear Algebra, Vector Calculus, Probability and Statistics
Deployment Toolbox	Azure, GCP, AWS, Docker, Flask, Streamlit
Optimization Tools	Pruning, Quantization, TFLite, TensorRT, Mixed Precision

Education

LJIET (LJ Institute of Engineering and Technology)	CGPA: 9.16
BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	

Certifications

2022	TensorFlow Developer Certificate	TensorFlow
2021	Microsoft Certified Azure Data Scientist Associate (DP100)	Microsoft
2020	Microsoft Certified Azure AI Fundamentals (AI900)	Microsoft

Honors and Awards

2016-2020	Mukhyamantri Yuva Swavalamban Yojana Scholarship - ₹36,500 (50% of tuition fees)
2022	Secured place in top 5 in TinyML contest at International Conference on Computer-Aided Design (ICCAD)

STUDENT LIFE & VOLUNTEERISM

IIT Bombay	2019
SOCIAL MEDIA MARKETER & COLLEGE AMBASSADOR	

- I served as a social media marketer and college ambassador for the IIT Bombay Tech Fest at my university.
- My responsibilities involved promoting the details of the tech fest on various social media platforms and within the university community. I actively encouraged students to participate in the event, fostering engagement and excitement.

LJIET	2018
VOLUNTEER	

- I volunteered at a significant state-level university event, specifically a technical coding competition that attracted 300 participants.
- As a volunteer, I assisted participants by explaining their tasks and providing necessary resources for successful completion. This experience allowed me to contribute to the smooth execution of the event while supporting and guiding the participating students.