Abhijith Premraj

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AbhijithP96

Summary

Results-driven AI Engineer with deep expertise in Computer Vision, Machine Learning, and Deep Learning, focused on building robust, real-world perception systems. Proven ability to design and deploy end-to-end vision pipelines, from camera calibration and depth estimation to 3D reconstruction and 6DoF pose estimation, for medical imaging, automation, and spatial computing domains. Proficient in Python, PyTorch, OpenCV, and 3D data processing with strong grounding in camera geometry, multi-view vision, and registration algorithms. Experienced in developing modular tools, GUI-based vision apps, and conducting custom dataset generation and model training. Holds a Master's in Digital Engineering (Germany), with current work on research publication in learning-based registration frameworks.

Experience

Master Thesis Oberkochen, Germany
Carl Zeiss Meditec AG Nov 2024 – Apr 2025

- Engineered a transformation pipeline to align 3D point clouds from single images to implement image registration workflow.
- Implemented pose optimization routines for image registration, to reduce alignment error.
- Generation and processing of new dataset.
- Training and evaluation of the models on new dataset.
- Tools: Python, Pytorch, OpenCV, CNN, Linux, Blender.

Computer Vision Intern Oberkochen, Germany
Carl Zeiss Meditec AG Feb 2024 – July 2024

- Built a modular calibration toolbox using OpenCV and MATLAB supporting multiple camera models and calibration patterns.
- Integrated outlier detection using statistical filtering to enhance robustness in Charuco board detection.
- Applied monocular depth estimation to generate interactive 3D visualizations.
- Tools: Python, Matlab, OpenCV, Multiprocessing, Calibration, GUI, CNN

Graduate Engineering Trainee Vadodara, Gujarat, India
CEAT Pvt. Ltd. July 2019 – Mar 2020

- Automated lab workflows and implemented data acquisition software, cutting manual data handling time.
- Built lab inventory management systems and contributed to the development of lab automation tools.

Education

Bauhaus University Weimar Oct 2022 – May 2025
M.Sc. Digital Engineering
CGPA: 9.3

- **Master Thesis**
  - Title: Head 3D Reconstruction and Head Pose Estimation using Surgical Microscopes.
  - Developed deep learning pipeline for object registration and spatial alignment using medical images
- **Project**
  - Capture, Model, Analyse and Visualize a Pedestrian Bridge (Photogrammetry + 3D Processing)
- **Focus Areas:** Computer Vision, Photogrammetry, Deep Learning, Machine Learning, Software Engineering, OOP, Optimization, Statistics, GIS, Simulation, Stochastics

IIT Madras Jan 2021 – Mar 2022
Foundation Degree in Data Science
CGPA: 8.4

- Coursework in Python Programming, Applied Mathematics, and Statistical Learning.

Cochin University of Science and Technology July 2015 – May 2019
B.Tech Mechanical Engineering
CGPA: 8.2

- **Focus Areas:** CAD/CAM, Mechatronics, Simulation, Engineering Mathematics, Automobile Engineering.
- Participated in SAE Baja India – responsible for brake and steering system design

Certifications

Microsoft Azure AI Essentials Professional Certificate Certificate Link
Issued by Microsoft and LinkedIn

- Covers the core concepts related to Artificial Intelligence (AI), along with Microsoft Azure services that can be used to build AI-powered solutions.

AI Agents Fundamentals Certificate Link
Issued by Hugging Face

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- Explored how AI agents operate using the Tools–Thoughts–Actions–Observations (TTAO) loop and their structured formats. Gained practical understanding of how LLMs handle messages, special tokens, and chat templates. Built simple agentic systems using Python functions as tools..

Projects

End-to-End Machine Learning Pipeline AbhijithP96/mlops

- Developed a fully automated ML pipeline covering data ingestion, preprocessing, model training, evaluation, deployment, and inference.
- Performed detailed EDA including feature distribution analysis, missing value visualization, and correlation heatmaps to drive data-driven feature engineering decisions.
- Leveraged ZenML for pipeline orchestration and reproducibility, and MLflow for experiment tracking and model deployment.
- Implemented dynamic inference workflows capable of batch and real-time predictions from APIs and databases.

Deep Learning with PyTorch AbhijithP96/DeepL$_C$V

- Trained multiple deep learning models for image classification and image generation tasks using PyTorch
- Applied transfer learning and hyperparameter tuning to optimize validation accuracy across datasets.
- Experimented with data augmentation, custom loss functions, and training optimizations (learning rate schedules, regularization)

3D Reconstruction Project Weimar, Germany
Bauhaus University Nov 2023 – Mar 2024

- Led the 3D digitization of a bridge using COLMAP and OpenMVS, producing a photo-realistic model.
- Integrated models into Unity for AR/VR applications, enabling immersive structural visualization.

Software Engineering Project Bauhaus University

- Built a desktop application in Java using Gradle, based on requirements provided by an external student team.
- Contributed to end-to-end SDLC: requirements analysis, OOP-based architecture design, implementation, and testing
- Practiced Agile methodologies, version control (Git), and CI principles in collaborative development.
- Conducted unit and integration testing to ensure compliance with client specifications and software quality.
- Wrote unit/integration tests and participated in regular code reviews to ensure system compliance and quality

Technical Skills

- **Computer Vision:** OpenCV, Open3D, COLMAP, VisualSFM, Meshroom, Blender, Camera Calibration, Pose Estimation, Object Detection, Depth Estimation, 3D Reconstruction
- **Deep Learning & AI:** PyTorch, CNNs, Transfer Learning, Style Transfer, Hugging Face, LlamaIndex, LangGraph, AI Agents
- **Programming Languages:** Python, Java
- **Data Science & Tools:** scikit-learn, pandas, SQL, MATLAB, QGIS
- **DevOps & Engineering:** Git, Azure, Linux, Docker, ROS, MLFlow, ZenML
- **Other Skills:** Optimization, AnyLogic, JSON

Languages

- English - C1
- Hindi - B2
- Malayalam - C1
- German - A2

References available on request.