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**Vinay T. Patil**

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**Summary**

Highly motivated and adaptable professional with 15 years of teaching experience and 3 years of AI/ML engineering expertise. Skilled in computer vision, deep learning, and machine learning methodologies. Passionate about applying AI to solve real-world problems. Currently pursuing a PhD in Computer Engineering, focusing on using deep learning techniques to counter DDoS attacks in IoT networks.

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**Work Experience****AI/ML Engineer**

Pixonate Labs Pvt. Ltd., Pune, Maharashtra

16<sup>th</sup> Jan 2024 – Present

- Developed and deployed deep learning models for gear tooth recognition, bearing seal defect detection, and printed text verification in industrial settings.
- Built real-time inference pipelines and desktop applications using PyQt, Streamlit, and Flask.
- Implemented OCR systems for batch number and character recognition using PaddleOCR and custom vision models.
- Designed AI solutions for medical imaging, including sickle cell anaemia detection.
- Collaborated with cross-functional teams to integrate AI models into production, improving quality control and automation.

**Assistant Professor**

Ajeenkya D Y Patil University, Pune, Maharashtra

1<sup>st</sup> Sep 2023 – 11<sup>th</sup> Jan 2024

- Conducted lectures on Data Structures, Artificial Intelligence, and Deep Learning, delivering complex concepts in an easy-to-understand manner to undergraduate students.
- Guided final-year students in their academic projects, emphasizing industry-relevant topics and innovative solutions.
- Fostered student-industry collaboration by connecting students with industry professionals and facilitating interactive sessions for better exposure.
- Mentored students in academic and career development, ensuring a deeper understanding of technical subjects and practical applications.

**Assistant Professor**

PSGVP Mandal's D. N. Patel College of Engineering, Shahada, Maharashtra

28<sup>th</sup> July 2008 – 31<sup>st</sup> August 2023

- Developed and delivered engaging curriculums for Python, C, C++, SQL, DBMS, Cyber Security, Machine Learning, and AI.
- Promoted critical thinking and problem-solving using innovative teaching methods.

- Monitored student progress and provided personalized feedback and learning strategies.
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## **Projects:**

### **Camshaft QR Code and Text Verification System**

- Developed a real-time vision system to detect QR codes and validate accompanying printed text on camshaft surfaces.
- Handled low-contrast and curved surface challenges using YOLO for QR detection, segmentation models text isolation, and PARSEQ OCR for text reading.
- Integrated the solution with industrial workflows using PyQt and Streamlit for UI, enabling live validation during production.

### **Gear Tooth Pattern Recognition using Deep Learning**

- Developed deep learning models for accurate segmentation of gear teeth and detection of surface patterns using image processing techniques.
- Designed and implemented a real-time inference pipeline, enabling the deployment of the models as a desktop application for industrial environments.
- Optimized the system for performance and reliability to support continuous usage in manufacturing settings.

### **Character Counting System for Printed Text on Bearing Components**

- Developed a system to count and verify characters printed on bearing components, improving quality control.
- Addressed challenges like text distortion and font variability using advanced computer vision techniques.
- Integrated the system with production workflows via Streamlit and Flask for demo, and PyQt to ensuring seamless deployment.

### **Bearing Pin Count Automation System**

- Developed an AI-powered vision system to detect and count bearing pins in high-speed production environments.
- Utilized YOLO-based object detection with post-processing logic to ensure accurate count validation under motion blur and occlusion.
- Integrated the system into existing shop-floor setups using PyQt with glowing animation to visualize detection, improving inspection speed and traceability.

### **Anemia Detection Using Eye Images**

- Built a deep learning model to detect signs of anemia by analyzing eye-region images, leveraging color and texture features linked to hemoglobin levels.
- Collected and preprocessed diverse eye image datasets to improve model generalization across skin tones and lighting conditions.
- Achieved early-stage anemia detection performance with potential integration into low-cost screening tools for primary healthcare.

### **Bearing Seal Defect Detection using Deep Learning**

- Developed a U-Net-based deep learning model with a ResNet-18 backbone for defect segmentation and detection in bearing seals.
- Designed a real-time inference pipeline and deployed the model as a desktop application for industrial use.

#### **Detection of Sickle Cell Anemia**

- Designed a deep learning model to analyze blood sample images for early detection of sickle cell anemia.
- Preprocessed image datasets to enhance model accuracy and reliability in medical diagnostics.
- Demonstrated a significant improvement in diagnostic efficiency compared to traditional methods.

#### **Automated Text Detection System for Bearing Components**

- Developed a system to detect and verify text presence on industrial bearing components, improving inspection accuracy.
- Trained a robust model capable of handling diverse text formats and inconsistent lighting conditions.
- Streamlined manufacturing operations by reducing manual oversight and improving text detection speed.

#### **Real-Time Sealant Application Detection System**

- Developed a deep learning model using ResNet architecture to detect sealant applications on gaskets in real time.
- Enhanced manufacturing automation by integrating the model into production systems for quality control.
- Designed a PyQt-based interface for intuitive user interaction and streamlined deployment.

#### **Batch Number Identification System**

- Built an OCR system using PaddleOCR to automate batch number detection on pharmaceutical products.
- Improved traceability and compliance by seamlessly integrating the system with existing manufacturing databases.
- Reduced error rates and enhanced data capture efficiency for batch tracking processes.

#### **Download Portal for Pathology Images – Tata Memorial Hospital**

- Designed the backend for a pathology image download portal using Django and SQLite, ensuring secure data handling.
- Architected efficient database schemas for high-volume image storage and retrieval.
- Collaborated with frontend teams to deliver a seamless and user-friendly experience for healthcare professionals.

#### **PhD Research:**

##### **DDoS Attack Detection in IoT Networks using Deep Learning**

(July 2021 – Present)

- Objective: Developing a deep learning-based system to detect and mitigate Distributed Denial of Service (DDoS) attacks in IoT networks.
- Technologies Used: Python, PyTorch, TensorFlow, Keras, OpenCV.

- Key Contributions:
    - Built a hybrid anomaly detection system using a combination of unsupervised and supervised learning techniques.
    - Applied feature selection and dimensionality reduction for handling large-scale IoT data.
    - Achieved robust real-time DDoS detection on IoT devices with low computational overhead.
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## Education

### PhD in Computer Engineering (Pursuing)

North Maharashtra University, Jalgaon, Maharashtra

### Master of Technology in Software Engineering (2015)

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, Madhya Pradesh

CGPA: 7.64

### Bachelor of Engineering in Information Technology (2007)

North Maharashtra University, Jalgaon, Maharashtra

Percentage: 64.78%

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## Skills

### Technical Skills:

- Programming Languages: Python, C++
  - Frameworks & Libraries: PyTorch, TensorFlow, OpenCV, scikit-learn, NumPy, Pandas, PyQt, PyModbus
  - Development Tools: Streamlit, Flask, FastAPI, Docker, Git
  - Machine Learning Techniques: Deep Learning, Computer Vision, Image Processing, LSTM, Object Detection, OCR
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## Declaration

I hereby declare that the above-written particulars are true to the best of my knowledge and belief.

Date:

Place:

(Vinay Patil)