

Machine learning Based Detection of ECG Abnormalities and Data Driven Insights Using Power BI



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Introduction

Heartnet India is a Cardiac healthcare Company, focusing on providing specialist care to cardiac patients across India with advanced technologies.

Mission

Empowering India to combat the growing burden of cardiovascular diseases by delivering comprehensive cardiac care through innovative and accessible technological solutions.

Vision

Heartnet’s vision is to make cardiac care easy, affordable, and available to everyone in India. Enabling real-time cardiac monitoring, early detection, and accessible heart care across diverse regions.

Organisation Structure



Project Overview: During my internship at Heartnet India, I built an AI-based model to classify ECG images as **Normal** or **Abnormal**. Also I made Dashboard using Power BI for data driven insights.

How I Prepared the model:

- Preprocessed ECG images by converting them into grayscale, resizing and flattening using OpenCV
- Labelled and combined Normal/Abnormal ECGs, then split data into training and test sets.
- Trained a Support Vector Classifier (SVC) with a linear Kernel for image classification.
- Evaluate the model using accuracy, confusion matrix, and classification report.

Technologies and Tools Used:

- Python(OpenCV, scikit-learn,Numpy,Matplotlib)
- SVC (Support Vector Classifier)
- Goole Colab.
- Gradio (For making Web Interface for my model)
- Power BI for Dashboard Creation

SWOT Analysis – Heartnet India

Strengths ✓ IoT based ECG diagnosis ✓ Affordable & accessible cardiac care ✓ Focus on Early Diagnosis ✓ Skilled and committed team	Weaknesses ⚠ Limited ECG dataset for training ⚠ Dependence on mobile/field data ⚠ Doesn't work Without Internet ⚠ Limited brand visibility nationwide
Opportunities ♦ Expansion into Tier 2 & 3 cities ♦ Collaborations with NGOs & public health ♦ Integration with telemedicine platforms ♦ Rising demand for remote heart care	Threats ✗ Competition from major hospitals & labs ✗ Regulatory & data privacy challenges ✗ Cybersecurity risks in digital health ✗ Resistance from traditional systems

Major Learning:

- Gained hands-on experience in building an AI model using **Support Vector Classifier (SVC)** for ECG classification.
- Learned how to preprocess medical image data using **OpenCV** and handle real-world data challenges.
- Developed skills in data visualization and storytelling through **Power BI dashboards**.
- Understood end-to-end workflow of health tech operations and AI integration in diagnostics.
- Improved critical thinking, problem-solving, and collaboration in a real-time project environment.

Challenges Faced

- **Limited and imbalanced ECG dataset** affected model training and generalization
- **Variation in ECG image Datasets** due to different sources and formats.



Practical Exposure V/S Theoretical Understanding

During my internship, I gained practical exposure by working on real-time healthcare data, building an AI-based ECG classification model, and creating interactive dashboards using Power BI. This hands-on experience helped me bridge the gap between theory and application. While theoretical understanding gave me the foundation in data analytics, machine learning, and visualization, practical exposure enhanced my problem-solving skills and deepened my learning through real-world challenges.