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Invention Title	AN ADVANCED SYSTEM FOR AUTOMATED IDENTIFICATION OF IRREGULAR HEARTBEATS IN ECG DATA USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
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Abstract:

The present invention discloses a system and method for the automated identification of irregular heartbeats in electrocardiogram (ECG) data using advanced artifici
intelligence (AI) and machine learning (ML) techniques. The system comprises modules for data acquisition, signal preprocessing, feature extraction, and heartbeat cl
enabling accurate detection of arrhythmias in real-time. The machine learning model, trained on extensive ECG datasets, classifies heartbeats based on spatial and te
patterns in the ECG signals. The system also includes a decision support module that generates diagnostic reports with confidence scores, and a user interface for cli
access and interpret the analysis results. This invention enhances the efficiency and accuracy of cardiac monitoring, improving patient outcomes in both clinical and r
settings. Accompanied Drawing [FIGS. 1-2]

Complete Specification

Description:[001] The present invention pertains to the field of medical diagnostics, specifically focusing on the automated analysis of electrocardiogram (ECG) data
identification of irregular heartbeats, commonly referred to as arrhythmias. Arrhythmias can manifest in various forms, ranging from benign to life-threatening con
making early detection and accurate diagnosis crucial for effective treatment and management. Traditional methods of analyzing ECG data rely heavily on manual
interpretation by clinicians, which can be time-consuming, subjective, and prone to errors.

[002] This invention addresses the challenges associated with manual ECG analysis by introducing an automated system that leverages the power of artificial intellig
and machine learning (ML) to detect and classify irregular heartbeats with high precision. The invention is applicable in a wide range of settings, including hospitals,
remote patient monitoring systems, and wearable health devices, offering a scalable solution for continuous and real-time cardiac monitoring.

[003] By integrating advanced AI and ML techniques, the invention significantly enhances the efficiency and accuracy of arrhythmia detection, providing valuable su
healthcare professionals in diagnosing cardiovascular conditions. The automated system not only reduces the workload of clinicians but also ensures a higher level
diagnostic consistency, ultimately contributing to improved patient outcomes in the field of cardiovascular care.

BACKGROUND OF THE INVENTION

[004] Irregular heartbeats, or arrhythmias, are abnormalities in the heart's rhythm that can vary from harmless to potentially fatal conditions. They can lead to vario
health complications, including stroke, heart failure, and sudden cardiac arrest. The early detection and accurate diagnosis of arrhythmias are critical for initiating ti
treatment and reducing the risk of severe outcomes. The standard diagnostic tool for identifying arrhythmias is the electrocardiogram (ECG), which records the elec
activity of the heart over time. Clinicians typically interpret ECG readings manually, a process that requires significant expertise and experience.

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