LITERATURE SURVEY

Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation

Domain: Artificial Intelligence

Team ID: PNT2022TMID09848

Team Members: Satayajit Smanta [7309730919106094]

Joydeep Panja [7309730919106036]

Mohammad Irfan [7309730919106053]

Nitesh Kumar[7309730919106060]

S.No	1
TITLE	Detection of Heart Arrhythmia on Electrocardiogram using Artificial Neural Network

PROPOSED WORK	This is how to detect heart arrhythmia on electrocardiogram by using artificial neural network.The ECG signals of individuals who were healthy,as well as those who suffered from arrhythmias were divided into 10-minute segmentsof equal length.onthe training and testing session,measured from 5men aged 26-45 and 13 women aged 20-50.The arrhythmia database was randomly selected from over 4000 records measured.The result for this project shown that high classification accuracy rates were obtained by applying ANN-basedclassifier model and also genetic algorithm method can detect features that improveclassification accuracy.
TOOLS USED/ ALGORITHM	a. ANN Models b. Physio net ECG database c. Decision tree algorithm d. Support vector machines and Dimension reduction techniques
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	This research makes use of a variety of diagnosis terminologies. The result has been high classification accuracy when attempting to diagnose arrhythmia based on ECG indications.
DISADVANTAGE	Eventhough the accuracyis not 100%,because the lengths of the signals are different in the datasetsused.

S.No	2

TITLE	Arrhythmia Classification Techniques Using Deep Neural Network
PROPOSED WORK	The primary goal of this research is to review the development of arrhythmias classification techniques over time, i.e., January 2010 to January 2020, using the machine and deep learning approach. The primary objectives of this research study are, To examine the arrhythmia classification techniques as practically implementable, To overview the existing research studies based on arrhythmia classification benefits and future research direction,Identify the latest research trends and publication interests based on arrhythmia classification.
TOOLS USED/ ALGORITHM	a. Recurrent neural network (RNN) b. Long short-term memory (LSTM) c. Autoencoder d. Convolutional neural network (CNN) e. Deep neural network (DNN) f. Deep belief network (DBN)
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	When performed on databases with vast volumes of highquality data, deep learning models perform well. As a result, a study on newly created big ECG datasets might lead to more effective models.
DISADVANTAGE	The most ECG databases are not specific to their clinical context. The description of the patient population in which these ECGs were obtained is lacking. This is important in interpreting the methodology and clinical utility in context. The algorithms are trained based on specific environments, and the generalized methodologies are Ignored

S.No	3
TITLE	Identification of arrhythmia by using a decision tree and gated network fusion model
PROPOSED WORK	In this project,aGate Recurrent Unit(GRU)and decision tree fusion model referred to as(T-GRU) was designed to explore the problem of arrhythmia recognition.The ECG time domain part is used as 80% as the training set,10% as the validation set, and 10% as the test set. The frequency domain section is divided into10 equal portions of the sample data set. The results showed that the low frequency band features dominated the model prediction. The fusion model had an accuracy of 98.31% sensitivity of 96.85%,specificity of 98.81% and precision of 96.73%.
TOOLS USED/ ALGORITHM	a. MIT-BIH arrhythmia database b. Decision tree algorithm c. GRU model T-GRU Fusion model
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	The GRU model parameters and weight control to improve the decision tree model output weights.the fusion model gives highest accuracy of 98.31%.Its hight reliability and clinical significance.
DISADVANTAGE	Although the deep learning has paved the way for more accurate diagnosis and treatment,further improvements are still necessary regarding performance,interpretability,And trustworthiness

S.No	4
TITLE	Arrhythmia Classification Algorithm Based on a Two-Dimensional Image and Modified EfficientNet
PROPOSED WORK	A preprocessing method is proposed to convert the original 1D ECG signal into a 2D image, which reflects the spatiotemporal features of the signal. AFF is introduced to replace the addition operation in the MBConv structure of the EfficientNet network. The proposed method effectively distinguishes eight types of heartbeats in the MIT-BIH arrhythmia database, with a classification accuracy of 99.54%.
TOOLS USED/ ALGORITHM	a. Welch method and discrete Fourier transform b. Wavelet scattering transform c. ECG morphological parameters and visual pattern characteristics d. Building a deep CNN model e. 1D to 2D + AFF-EfficientNet
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	Given the influence of available laboratory equipment, we converted 1D ECG signals into 2D image signals and used spatiotemporal characteristics to perform classification experiments on eight ECG signal types in the MIT-BIH arrhythmia database, achieving relatively high accuracy of 99.54% based on the improved EfficientNet-B0 network.
DISADVANTAGE	The main limitation of the proposed arrhythmia classification algorithm is the low positive prediction accuracy for identifying APC beats.

S.No	5
TITLE	Classification of Arrhythmia in Heartbeat Detection Using Deep Learning
PROPOSED WORK	Automatic exposure to ECG-based arrhythmia is very convenient since it eliminates physicians' need to personally interpret the signs and allows people to track their cardiac symptoms using handheld devices
TOOLS USED/ ALGORITHM	a. MIT-BIH Arrhythmia Dataset (N, S, V, F, and Q) b. NumPy c. Seaborn for python backend deep learning library to implement deep learning techniques. Google colaboratory.
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	When performed on databases with vast volumes of highquality data, deep learning models perform well. As a result, a study on newly created big ECG datasets might lead to more effective models.
DISADVANTAGE	The challenges in designing and adjusting CNN models, the high computational cost of neural networks. They require a large dataset for successful training.

S.No	6
TITLE	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation
PROPOSED WORK	The method consists of five steps, i.e., signal pre-processing, generation of 2-D images (spectrograms), augmentation of data, extraction of features from the data (using the CNN model), and its classification based on the extracted features. The details of these steps are presented in the following subsections.
TOOLS USED/ ALGORITHM	a. Convolutional neural networks (CNNs) b. artificial neural networks (ANNs) c. Deep Neural Network(DNNs)
TECHNOLOGY	ARTIFICIAL INTELLIGENCE
ADVANTAGE	The proposed model was based on a 2-D representation of the ECG data to efficiently apply 2-D CNN models and benefit from the flexibility of data augmentation in such methods.
DISADVANTAGE	Proposed model can be trained on other classes of arrhythmia, although we did not perform this analysis so that we can compare our work with published results that use a 2-D representation of ECG data.