CLASSIFICATION OF ARRHYTHMIA BY USING DEEP LEARNING WITH 2-D ECG SPECTRAL IMAGE REPRESENTATION

Prior Knowledge

Supervised Learning

Supervised machine learning requires labelled input and output data during the training phase of the machine learning life cycle. This training data is often labelled by a data scientist in the preparation phase, before being used to train and test the model. Once the model has learned the relationship between the input and output data, it can be used to classify new and unseen datasets and predict outcomes.

The reason it is called supervised machine learning is because at least part of this approach requires human oversight. The vast majority of available data is unlabelled, raw data. Human interaction is generally required to accurately label data ready for supervised learning. Naturally, this can be a resource intensive process, as large arrays of accurately labelled training data is needed.

Unsupervised learning

Unsupervised machine learning is the training of models on raw and unlabelled training data. It is often used to identify patterns and trends in raw datasets, or to cluster similar data into a specific number of groups. It's also often an approach used in the early exploratory phase to better understand the datasets.

MACHINE LEARNING

Classification

Classification is a process of categorizing a given set of data into classes, It can be performed on both structured or unstructured data. The process starts with predicting the class of given data points. The classes are often referred to as target, label or categories.

The classification predictive modeling is the task of approximating the mapping function from input variables to discrete output variables. The main goal is to identify which class/category the new data will fall into.

Heart disease detection can be identified as a classification problem, this is a binary classification since there can be only two classes i.e has heart disease or does not have heart disease.

Regression

Regression is a technique for investigating the relationship between independent variables or features and a dependent variable or outcome. It's used as a method for predictive modelling in machine learning, in which an algorithm is used to predict continuous outcomes.
Solving regression problems is one of the most common applications for machine learning models, especially in supervised machine learning. Algorithms are trained to understand the relationship between independent variables and an outcome or dependent variable.

Clustering

Clustering is the task of dividing the population or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group and dissimilar to the data points in other groups. It is basically a collection of objects on the basis of similarity and dissimilarity between them**.**

NEURAL NETWORK

ANN(Artificial Neural Network**)**

An artificial neural network has three or more layers that are interconnected. The first layer consists of input neurons. Those neurons send data on to the deeper layers, which in turn will send the final output data to the last output layer.All the inner layers are hidden and are formed by units which adaptively change the information received from layer to layer through a series of transformations. Each layer acts both as an input and output layer that allows the ANN to understand more complex objects**.**

CNN(Convolutional Neural Network**)**

A convolutional neural network can have tens or hundreds of layers that each learn to detect different features of an image. Filters are applied to each training image at different resolutions, and the output of each convolved image is used as the input to the next layer. The filters can start as very simple features, such as brightness and edges, and increase in complexity to features that uniquely define the object.

RNN(Recurrent Neural Network)

Recurrent neural network (RNN) is a special type of artificial neural network adapted to work for time series data or data that involves sequences. Ordinary feedforward neural networks are only meant for data points that are independent of each other. However, if we have data in a sequence such that one data point depends upon the previous data point, we need to modify the neural network to incorporate the dependencies between these data points. RNNs have the concept of "memory" that helps them store the states or information of previous inputs to generate the next output of the sequence