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Smart ECG Reporting and Monitoring System

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ABSTRACT: We propose an effective electrocar diogram (ECG) arrhythmia classification method using a deep learning two-dimensional convolutional neural network (CNN) which recently shows outstanding performance in the field of pattern recognition According to the World Health Organization (WHO), cardiovascular diseases (CVDs) are the number one cause of death today. Over 17.7 million people died from CVDs in the year 2017 all over the world which is about 31% of all deaths, and over 75% of these deaths occur in low and middle income countries. Arrhythmia is a representative type of CVD that refers to any irregular change from the normal heart rhythms. There are several types of arrhythmia including atrial fibrillation, premature contraction, ventricular fibrillation, and tachycardia. Although single arrhythmia heartbeat may not have a serious impact on life, continuous arrhythmia beats can result in fatal circumstances. For example, prolonged premature ventricular contraction (PVCs) beats occasionally turn into a ventricular tachycardia (VT) or ventricular fibrillation (VF) beats which can immediately lead to heart failure. Thus, it is important to periodically monitor the heart rhythms to manage and prevent the CVDs. Electrocar diogram (ECG) is a non-invasive medical tool that displays the rhythm and status of the heart. Therefore, automatic detection of irregular heart rhythms from ECG signals is a significant task in the fieldof cardiology.

Keywords—Machine Learning, Artificial Intelligence, Convolution Neural Network, ECG, Arrhythmia.

I. INTRODUCTION

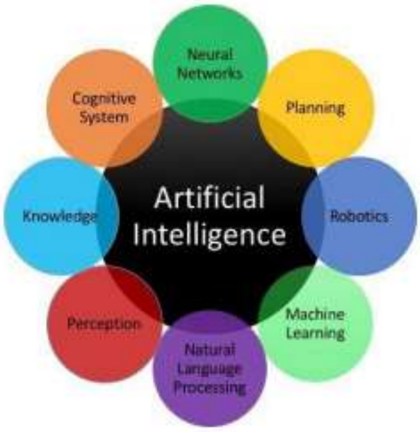
Health monitoring systems have rapidly evolved during the past two decades and have the potential to change the way health care is currently delivered. Although smart health monitoring system automate patient's monitoring tasks and, there by improves the patient's workflow management, and their efficiency. This report of the system presents, the view of smart health monitoring system and an overview of their design and modeling. Furthermore, acritical analysis of the efficiency, clinical acceptability, strategies and recommendations on improving current health monitoring systems will be presented. The main aim is to review current state of the health monitoring systems and toper form extensive and an in depth analysis of the finding s in the area of smart health monitoring system application. In order to achieve this, different monitoring systems have been selected, categorized, classified and compared.

II. SCOPE OF THE PROJECT

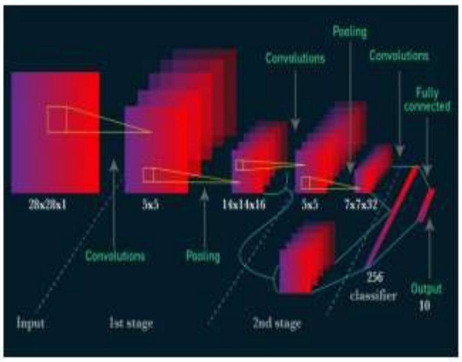
We will be using the machine learning algorithms and techniques to train a bot which has to perform complex tasks. The range of inputs will be higher, the objective of the game will be difficult to achieve (as per human standards) and shortest path algorithm will be used to traverse the path which will be very complex. By the end of the project, the developed game will show how to efficiently complete the game in limited time span irrespective of the game's complexity. The bot will be developed such that it has minimal time and space complexities, will be portable i.e. the bot can be transferred from one machine to another without affecting the performance of the bot and will be machine independent. To make the bot efficient, it will be rigorously trained for ample amount of time so that it can overcome any hurdle or new additions in the original game. This system can be used by the patient who is suffering from heart related disease. Report can be examined through laptop or desktop. Diagnosis and analysis of their port is done with the help of artificial intelligence for accuracy. This system is and can be benefited in situation like Covid-19.The system handling the patient according to priority so that it is better result produced by the system to get used. Medical data or report is shared on patient consent.

III. ARTIFICIAL NEURALNETWORKS

Artificial intelligence uses machine learning to mimic human intelligence. The computer has to learn how to respond to certain actions, so it uses algorithms and historical data to create something called a propensity model. Propensity models will then start making predictions.



We will be building a ConvNet made of two hidden layers or convolutional layers. Now let us look at one of the images and the dimensions of the images. the plunger back out to its original rest position.



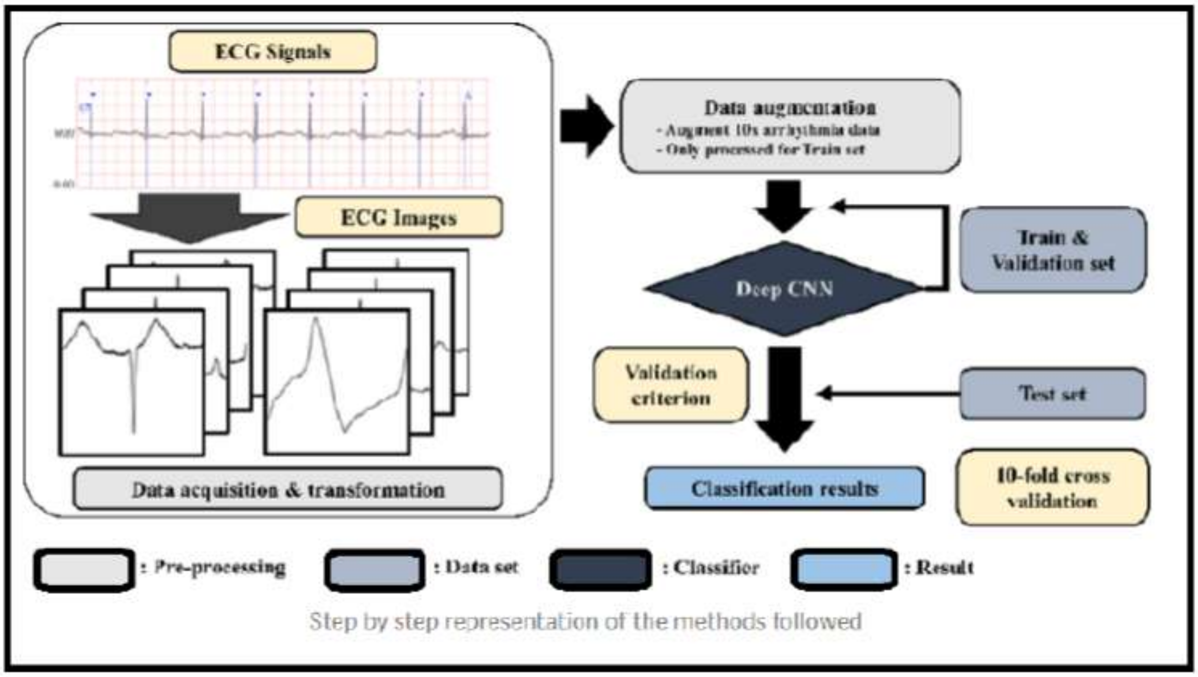
CONVOLUTIONAL NEURALNETWORK

CNN Algorithm:

A Convolutional Neural Network (Conv Net/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The name "convolutional neural network" indicates that the network employs a mathematical operation called convolution. Convolution is a specialized kind of linear operation. Convolutional networks are simply neural networks that use convolution in place of general matrix multiplication in at least one of their layers. The preprocessing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics. The name "convolutional neural network" indicates that the network employs a mathematical operation called convolution. Convolution is a specialized kind of linear operation. Convolutional networks are simply neural networks that use convolution in place of general matrix multiplication in atleast one of their layers. In machine learning, Convolutional Neural Networks (CNN or ConvNet) are complex feed forward neural networks. CNNs are used for image classification and recognition because of its high accuracy. It was proposed by computer scientist Yann LeCun in the late 90s, when he was inspired from the human visual perception of recognizing things. The CNN follows a hierarchical model which works on building a network, like a funnel, and finally gives out a fully-connected layer where all the neurons are connected to each other and the output is processed. We will construct a new ConvNet step-by-step in this article to explain it further. In this example, we will be implementing the (Modified National Institute of Standards and Technology) MNIST data set for image classification. This data set contains ten digits from 0 to 9. It has 55,000 images — the test set has 10,000 images and the validation set has 5,000 images.

IV. IMPLEMENTATION

This repository is an implementation of the paper ECG arrhythmia classification using a 2-D convolutional neural network in which we classify ECG into seven categories, one being normal and the other six being different types of arrhythmia using deep two-dimensional CNN with grayscale ECG images. By transforming one-dimensional ECG signals into two-dimensional ECG images, noise filtering and feature extraction are no longer required. This is important since some of ECG beats are ignored in noise filtering and feature extraction. In addition, training data can be enlarged by augmenting the ECG images which results in higher classification accuracy. Data augmentation is hard to be applied in 1-d signals since the distortion of 1- d ECG signal could downgrade the performance of the classifier. However, augmenting twodimensional ECG images with different cropping methods helps the CNN model to train with different viewpoints of the single ECG images. Using ECG image as an input data of the ECG arrhythmia classification also benefits in the sense of robustness.



SYSTEM ARCHITECTURE

V. RESULT AND CONCLUSION

RESULT

•Over ECG beat images are obtained with eight types of ECG beats including normal beat and seven arrhythmia beats.

• Optimized CNN model is designed with considering important concepts such as data augmentation, regularization, and K-fold crossvalidation.

• Our ECG arrhythmia classification result indicates that detection of arrhythmia with ECG images and CNN model can be an effective approach to help the experts to diagnose cardiovascular diseases which can be seen from ECG signals

• Proposed ECG arrhythmia classification method can be applied to the medical robot or the scanner that can monitors the ECG signals and helps the medical experts to identify ECG arrhythmia more precisely and easily.

CONCLUSION

In this A smart ECG report monitoring system is described, that integrates new technology offering ease of use and immediate response of heart related diseases by getting report. The proposed system is for diagnosing the patients disease online by receiving the problem from the patient, where in case the patient dose not have enough time to visit doctor and wait for there port to come and then get the feedback from the doctor. Along with getting the immediate response of the problem it also saves the time to visit the doctor. It is capable of taking corrective actions in case of doctor is far away from the patient or patient is not reachable to the doctor

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