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

LITERATURE SURVEY

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S.NO	PAPER	AUTHOR	YEAR	SHORT DESCRIPTION	RESULT	FUTURE WORK AND ANALYSIS
1.	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation	Amin Ullah, Syed Anwar, Muhammad Bilal, Raja Majid Mehmood	2020	The classification of ECG data into eight classes using a two-dimensional (2-D) convolutional neural network (CNN) model is proposed. These classes are normal beat, premature ventricular contraction beat, paced beat, right bundle branch block beat, left bundle branch block beat, atrial premature contraction beat, ventricular flutter wave beat, and ventricular escape beat. Short-time Fourier transform is used to convert the one-dimensional ECG time series signals into two-dimensional spectrograms. The 2-D CNN model is made to extract robust features	The proposed method outperformed recently reported findings in classifying similar types of arrhythmias, with an average classification accuracy of 99.11% that is at the cutting edge. The success of the suggested strategy is demonstrated by the performance being significant in additional indices, such	Among all of the compared CNN algorithms, the suggested model has acquired the highest sensitivity. It is important to remember that finding these cardiac arrhythmias requires a lot of work, requiring a clinical expert to meticulously review recordings for up to hours at a time. By identifying these patterns and prompting the observer to pay closer attention to areas of greater significance, the

				from the input spectrograms, and it has four convolutional layers and four pooling layers.	as sensitivity and specificity.	artificially intelligent system could improve the performance of clinical specialists. The clinical diagnosis and treatment of some of the major CVDs would ultimately benefit from this.
2.	Cardiac arrhythmia detection using deep learning	Ali Isina, Selen Ozdalili	2017	In everyday clinical practise, an ECG is a crucial diagnostic tool for evaluating heart arrhythmias. By grouping patient ECGs into appropriate cardiac states, a deep learning framework that has previously been trained on a general picture data set is applied to carry out automatic ECG arrhythmia diagnosis. The final classification is carried out using a basic back propagation neural network using the features recovered by a transferred deep convolutional neural network, which is employed as a feature extractor.	We saw that the ECG data from the MIT-BIH database was pre-processed, that QRS complexes were found, and that characteristics from R-T intervals were retrieved. Networks based on transferable deep learning feature extraction obtained over 100% recognition rates and accuracies above 96% in the training phase, according to an evaluation of all the studied networks.	Deep learning applications will deliver cutting-edge results not just in medical signals and imaging diagnostics, but also in other popular subfields of biomedical imaging and signals.
3.	Arrhythmia Classification Techniques Using Deep Neural Network	Ali Haider Khan,Muzammi l Hussain ,and Muhammad Kamran Malik	2021	The automatic classification of arrhythmias based on ECG beats has been established for ages. The automatic	The use of imbalanced data for classification is the most significant	Automated arrhythmia identification necessitated feature extraction from ECG

				arrhythmia classification algorithms built on deep learning are highly accurate. The use of imbalanced data for classification is the most significant factor affecting the effectiveness of the created arrhythmia detection systems, along with (i) manual feature selection, (ii) feature extraction methods, and (iii) classification algorithm.	issue that affects the effectiveness of the established arrhythmia detection systems, along with (i) manual feature selection, (ii) features extraction methods, and (iii) classification algorithms.	images, which called for subject-matter expertise. To prevent overfitting, a balanced dataset must be utilised with the classification techniques.
4.	A deep convolutional neural network model to classify heartbeats	U. Rajendra Acharya, Shu Lih Oh, Yuki Hagiwara, Jen Hong Tan, Muhammad Adam	2017	The distinction between normal and irregular heartbeats and their proper classification into various diseases based on ECG morphology form the foundation of arrhythmia diagnosis. Five categories of heartbeats can be distinguished: non-ectopic, supraventricular ectopic, ventricular ectopic, fusion, and unidentified beats. Distinguishing these heartbeats on an ECG is difficult and time-consuming since these signals are frequently distorted by noise. To automatically distinguish between five different types of heartbeats in ECG readings, we created a 9-layer deep convolutional neural network (CNN). Our study used original and noise-attenuated sets of	The number of instances of each of the five kinds of heartbeats in this set was artificially increased, and high-frequency noise was removed by filtering. With the use of the enhanced data, the CNN was trained, and it was able to diagnose heartbeats in both the original and noise-free ECGs with an accuracy of 94.03% and 93.47%, respectively. When CNN received training from highly	The scientists hope to expand on their suggested model in subsequent research by teaching a CNN to distinguish temporal patterns of ECG heartbeat data. The five classes of ECG heartbeats (N, S, V, F, and Q) that were taken into consideration in this work can be categorised into three primary groups: green, yellow, and red, which stand for normal, abnormal, and possibly fatal situations of heart electrical activity, respectively. In further studies, the authors intend to discuss the performance of the CNN model

				ECG signals that were taken from a public database.	In noisy and noise-free ECGs, respectively, the accuracy of the CNN dropped to 89.07% and 89.3% due to imbalanced data (original dataset). The suggested CNN model, when correctly trained, can be used as a screening tool for ECGs to swiftly identify various types and frequencies of arrhythmic heartbeats.	utilising de-skewed data as well as data that has varied levels of noise added.
5.	Classification of Arrhythmia in Heartbeat Detection Using Deep Learning.	Wusat Ullah,Imran Siddique , Rana Muhammad Zulqarnain , Mohammad Mahtab Alam , Irfan Ahmad, and Usman Ahmad Raza.	2021	Aims to classify arrhythmia using deep learning methods on a publically available dataset. The system combines RR intervals, signal morphology, and higher-level statistical data, three independent forms of information. The analysis of computerised ECGs using fuzzy-based technology is successful, although further study is required.	With a 99.12 percent accuracy rate for the CNN model, a 99.3 percent accuracy rate for the CNN + LSTM model, and a 99.29 percent accuracy rate for the CNN + LSTM + Attention Model, it has the capacity to make extremely precise predictions.	Conducting this investigation across interconnected areas like cloud and mobile systems is a good idea. The development of integrated low-power consumption wearable technology is also crucial.