LITERATURE SURVEY

Sena Yağmur ŞEN et.al[1] proposed that y, the electrocardiography (ECG) arrhythmias have been classified by the proposed framework depend on deep neural networks in order to features information. The proposed approaches operates with a large volume of raw ECG time-series data and ECG signal spectrograms as inputs to a deep convolutional neural networks (CNN). Heartbeats are classified as normal (N), premature ventricular contractions (PVC), right bundle branch block (RBBB) rhythm by using ECG signals obtained from MIT-BIH arrhythmia database. The first approach is to directly use ECG time-series signals as input to CNN, and in the second approach ECG signals are converted into time frequency domain matrices and sent to CNN. The most appropriate parameters such as number of the layers, size and number of the filters are optimized heuristically for fast and efficient operation of the CNN algorithm. The proposed system demonstrated high classification rate for the time series data and spectrograms by using deep learning algorithms without standard feature extraction methods. Performance evaluation is based on the average sensitivity, specificity and accuracy values. It is also worth to note that spectrogram increases the performance of classification since it extracts the useful time-frequency information of the signal.

B.V.K.Vijaya Kumar et.al[2]proposed that Computer-assisted cardiac arrhythmia detection and classification can play a significant role in the management of cardiac disorders. In this paper, we propose a new approach for arrhythmia classification based on a combination of morphological and dynamic features. Wavelet Transform (WT) and Independent Component Analysis (ICA) are applied separately to each heartbeat to extract corresponding coefficients, which are categorized as 'morphological' features. In addition, RR interval information is also obtained characterizing the 'rhythm' around the corresponding heartbeat providing 'dynamic' features. These two different types of features are then concatenated and Support Vector Machine (SVM) is utilized for the classification of heartbeats into 15 classes. The procedure is applied to the data from two ECG leads independently and the two results are fused for the final decision. Compare the two classification results and the classification result is kept if the two are identical or the one with greater classification confidence is picked up if the two are inconsistent. The proposed method was tested over the entire MIT-BIH Arrhythmias Database [1] and it yields an overall accuracy of 99.66% on 85945 heartbeats, better than any other published results.

Mavera Mazhar Butt et.al[3] proposed that Any morphological abnormality or atypical group of conditions in a cardiac rhythm indicates a typical class of arrhythmias. ECG plays a vital role in diagnosis of many such cardiac disorders. Some arrhythmias including ventricular fibrillation and premature ventricular contraction can be fatal if not dealt on time. Clinical analysis of ECGs by physicians may result into an inaccurate as well as a time-consuming analysis of a critically serious arrhythmia patient mostly involving measuring the ECG statistics from calipers. Considering the importance of morphological shapes and statistics of ECG signals in arrhythmia diagnosis, these features are input to a dedicated system which act as key markers to categorize various arrhythmias automatically. This paper highlights the development of an algorithm for classifying 15 different cardiac arrhythmias using a novel statistical feature set of ECG signals in time domain. Rhythm annotations from the bench mark MIT-BIH Cardiac Arrhythmia database have been used to organize the data as rhythms. The proposed method has been simulated and tested in MATLAB and results have been discussed in detail.

Weifang Sun et.al[4] proposed that Electrocardiogram (ECG) signal represents the electrical activity of the heart and playing an increasingly important role for practitioners to diagnose heart diseases. Widely available ECG data and machine learning algorithms present an opportunity to improve the accuracy of automated arrhythmia diagnosis. However, a comprehensive evaluation of morphological arrhythmias for ECG analysis across a wide variety of diagnostic classes is still a complex task. This paper presents a generic morphological arrhythmias classification method designed for robust and accurate detection of ECG heartbeat. In this method, the gray level co-occurrence matrix (GLCM) is employed for features vector description because of its extraordinary statistical feature extraction ability. In addition, the convolutional neural network (CNN) approach is utilized to automatically classification from the generated 3D multi-scale GLCM. Obtained results from the experiments demonstrate that the proposed method in this paper is quite suitable for morphological arrhythmias detection. These findings demonstrate that GLCM description can efficiency extract the shape features vector for a broad range of distinct arrhythmias from lead ECGs with high diagnostic performance. The experimental results of the recognition for morphological arrhythmias show the feasibility and effectiveness of the proposed method and could be used to reduce the rate of misdiagnosed computerized ECG interpretations.

Sandipan Chakroborty et.al[5] proposed that a coarse-to-fine arrhythmia classification technique that can be used for efficient processing of large Electrocardiogram (ECG) records. This technique reduces time-complexity of arrhythmia classification by reducing size of the beats as well as by quantizing the number of beats using Multi-Section Vector Quantization (MSVQ) without compromising on the accuracy of the classification. The proposed solution is tested on MIT-BIH arrhythmia database. This work achieves a highest computational speed-up factor of 2.2:1 in comparison with standard arrhythmia classification technique with marginal loss (<1%) in classification accuracy. The clinical application of this technique enhances physician's throughput by factor of 2x while processing large ECG records from Holter system.

Omid Sayadi et.al[6] proposed that a novel nonlinear joint dynamical model is presented, which is based on a set of coupled ordinary differential equations of motion and a Gaussian mixture model representation of pulsatile cardiovascular (CV) signals. In the proposed framework, the joint interdependences of CV signals are incorporated by assuming a unique angular frequency that controls the limit cycle of the heart rate. Moreover, the time consequence of CV signals is controlled by the same phase parameter that results in the space dimensionality reduction. These joint equations together with linear assignments to observation are further used in the Kalman filter structure for estimation and tracking. Moreover, we propose a measure of signal fidelity by monitoring the covariance matrix of the innovation signals throughout the filtering procedure. Five categories of life-threatening arrhythmias were verified by simultaneously tracking the signal fidelity and the polar representation of the CV signal estimations. We analyzed data from Physiobank multiparameter databases (MIMIC I and II). Performance evaluation results demonstrated that the sensitivity of the detection ranges over 93.50% and 100.00%. In particular, the addition of more CV signals improved the positive predictivity of the proposed method to 99.27% for the total arrhythmic types. The method was also used for false arrhythmia suppression issued by ICU monitors, with an overall false suppression rate reduced from 42.3% to 9.9%. In addition, false critical ECG arrhythmia alarm rates were found to be, on average, 42.3%, with individual rates varying between 16.7% and 86.5%. The results illustrate that the method can contribute to, and enhance the performance of clinical life-threatening arrhythmia detection.