

(54) Title of the invention : AUTOMATED DETECTION OF CARDIAC ARRHYTHMIA USING RNN

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(71)Name of Applicant :
1)St. Martin's Engineering College
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
 Name of Applicant : NA
 Address of Applicant : NA
 (72)Name of Inventor :
1)Dr. R. Santhoshkumar Associate Professor and Head, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
2)Dr. P Santosh Kumar Patra Professor, Dept. of CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
3)P. Swetha Assistant Professor, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
4)Dr. V. K. Senthil Ragavan Professor, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
5)M.Sindhuja Assistant Professor, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
6)Andrala Amulya Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
7)Sampath Nitin Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
8)Kokkerala Vaishnavi, Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
9)Tharala Uday Kiran Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
10)Behara Sai Kishan Kumar, Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
11)Kavadi Anudeep Reddy, Student CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
12)Gode Kunal, Student, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
13)Nuguri Sanjana,Student, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----
14)Pabbu Bharath, Student, CSE
 Address of Applicant :St.Martin's Engineering College, Dhulapally Kompally Secunderabad -----

(57) Abstract :

Cardiac arrhythmia is a condition where irregular heart rhythms occur. According to World Health Organization (WHO), about 17 million people in the world die every year due to cardiovascular diseases. This is about 31% of the total deaths globally. According to the statistics of American Heart Association (AHA), one out of every three deaths in US is related to cardiovascular diseases. The deaths due to cardiovascular diseases are more than due to all types of cancer and chronic lower respiratory diseases combined. A 2014 study indicates that approximately 2 to 3% of the people in North American and European countries are affected by atrial fibrillation. A heart rate which is high (above 100 beats per minute in adults) is called tachycardia and a heart rate that is slow (below 60 beats per minute) is called bradycardia. If the beat is too early, then it is called premature contraction. Irregular beat is called fibrillation or flutter. Other than the criteria of heart rate, there are a number of other classifications for cardiac arrhythmia depending upon different types of criteria. Another type of classification is in terms of the site of origin of the irregular heart rate. Cardiac arrhythmia is a condition where heartbeat is irregular. The goal is to apply deep learning techniques in the diagnosis of cardiac arrhythmia using ECG signals with minimal possible data pre-processing. We employ one-dimension convolutional neural network (1D-CNN), and long short-term memory (LSTM) to automatically detect the abnormality. This work is focused on the design of CNN and LSTM algorithms to predict Arrhythmia diseases with 7 different stages. To train both algorithms, the MIT-BH dataset is used with 7 different disease stages. Further, existing LSTM resulted in low accuracy. So, this work adopted the CNN model for training and testing Arrhythmia disease.

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