ANN & GA FOR IMAGE COMPUTATION OF DECISION MAKING PROCESS IN MACHINE LEARNING

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Abstract

ANN is useful in finding many uses in the medical analysis and diagnosis application. ANN is used in a variety of health field for discovery & analysis and also for prediction purpose. Common health care include heart diseases detection, Lungs detection and kidney stone detection. One of the most frequent techniques for training a neural network is to use supervised training with back-propagation. Classification is an significant tool in medicinal diagnosis decision support. Feed-forward back propagation neural network is used as a classifier to differentiate between infected or non-infected person in both cases. The data were obtained from UCI machine learning repository in order to diagnosed diseases. The data is separated into inputs and targets. The objective for the neural network will be identified with 1's as infected and will be identified with 0's as non-infected. In the diagnosis of heart disease; the percent correctly classified in the simulation sample by the feed-forward back propagation network is 95 percent we've trained our neural network with a genetic algorithm. To carry out some basic mathematical functions. We've seen how the condition test is the key after evolving the correct neural network. We simply need to modify the fitness function and our genetic algorithm handles the rest the genetic algorithm will actually evolve anything you want, based on the fitness function..

Keywords: Artificial Neural Networks, Image Processing, Machine learning.

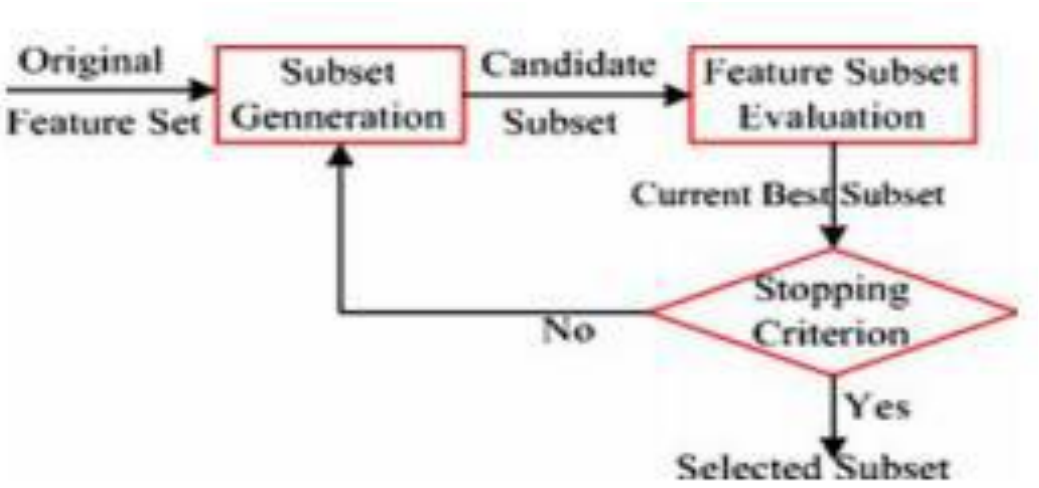
I. INTRODUCTION

Scientific Heart disease is the leading cause of death for over the past 10 years. The World Health Organization (WHO) report be that heart disease is the first leading cause of death in high and low income countries. According to statistic of World Health Organization (WHO), Heart disease is the number one causes of deaths worldwide in 2011. Heart disease caused 7 million deaths in 2011. If current trends are allowed to continue, by 2030 an estimated 23.6 million people will die from heart disease. So there is a need to find out accurate signs of heart disease in early stage and to treat these signs with

proper medical treatment to save someone's life. Hence there is a need to develop predictive applications which will help to find out early signs of heart disease and its risk. This research takes different parameters such as age, personal information, medical history, diet, lifestyle, etc which tries to cover all the important factors which can lead to heart diseases. Based on this information it will give the proper guidelines to control it. These parameters are processed using artificial neural network to predict heart risk. Many neural network model, even biological neural network assume main simplification over actual biological neural network. Such simplifications are necessary to understand the intended properties and to attempt any mathematics analysis. Even if all the properties of the neurons were known, simplification still needed for analytical purpose. All such models are known as artificial neural network, here after called as ANNs. In ANNs, all the neurons are operating at the same time leading to parallel structure, which makes them to perform tasks at much faster rate compared to conventional computer.

RELATED WORK

Medical Diagnosis Systems plays an important role in medical field and are used by medical practitioner for diagnosis and treatment. In this paper, a medical diagnosis system is presented for predicting the risk of heart disease. In this paper the relative advantages of genetic algorithm and neural network are combined to achieve the desired accuracy. Feed-forward and fitting neural networks are used for the suited complex problems. ANN's are often used as a powerful discriminating classifier for tasks in medical diagnosis for early detection of diseases. The objective of this paper is to determine the weights of the neural network using genetic algorithm in less number of iterations. The dataset provided by University of Cleveland, is used for training and testing. In order to perform the training, the dataset is preprocessed to make it suitable. Genetic based neural network is used for training the system and accuracy comparison is done between the normal neural network and the GA based optimized neural network. The accuracy obtained using this approach is 97.75%.



The existing system was done only by manual to detect the epilepsy.

- The existing system of artificial neural network based detection systems for epileptic diagnosis has been proposed by several researchers.
- The method proposed by Weng and Khorasani uses the features proposed by Gotman and Wang, namely, average EEG amplitude, average EEG duration, co efficient of variation, dominant frequency, and average power spectrum as inputs to an adaptive structured neural network.
- The method proposed by Pradhan et al. uses a raw EEG signal as an input to a learning vector quantization network.
- In 2004, Nigam and Graupe proposed a new neural network model called LAMSTAR network, and two time-domain attributes of EEG, namely, relative spike amplitude and spike rhythm city have been used as inputs for the purpose of the detection of epilepsy.
- The method proposed by Kiymik et al. uses a back propagation neural network with period gram and autoregressive features as the input for the automated detection of epilepsy

Proposed Methods

Feed-forward neural networks are widely and successfully used models for classification, forecasting and problem solving. A typical feed-forward back propagation neural network is proposed to diagnosis diseases. It consists of three layers: the input layer, a hidden layer, and the output layer. A one hidden with 20 hidden layer neurons is created and trained. The input and target samples are automatically divided into training, validation and test sets. The training set is used to teach the network. Training

continues as long as the network continues improving on the validation set.

The test set provides a completely independent measure of network accuracy. The information moves in only one direction, forward, from the input nodes, through the hidden nodes and to the output nodes. There are no cycles or loops in the network. The proposed neural networks are shown

- Though the use of Artificial Neural Networks increases the computational complexity, the high overall detection accuracies achieved with this system surpasses its disadvantage as in any automated seizure detection system; the detection of the seizure with high accuracy is of primary importance. Approximate Entropy shows clear discrimination between the normal and epileptic EEG signals.
- The optimum Approximate Entropy obtained based on this data may not hold good for a general case. Hence, using a linear separator with known Approximate Entropy parameter values may not give good results in situations where a large number of different subjects are involved. This problem will not arise in the proposed ANN-based method as it has performed well irrespective of the Approximate Entropy used.
- It is known that Approximate Entropy possesses good characteristics such as robustness in the characterization of the epileptic patterns and low computational burden. Hence, an automated system using Approximate Entropy as the input feature is best suited for the real-time detection of the epileptic seizures.
- The proposed system is based on two types of EEG, namely, EEG signals of awake and epileptic subjects. It can be made more robust by acclimatizing it to the other manifestations of EEG like sleep EEG.

Algorithm

- Take input from users.
- Initialize weights with some random values.
- Transmit the data received to the first hidden layer.
- In this hidden layer, calculate the net input (X), by using the following equation where I is input and W are the weights for the inputs.

$$X_i = \sum_{i=1}^{n} I_i W_i$$

- Compute the output of the hidden layer by applying activation function over X and send it to the next hidden layer.
- Repeat steps 4 & 5 for the rest of the hidden layers.

- The final hidden layer will send its output to the output layer.
- The output is computed by using the following equation, where Z is the output.

$$Z_i = \sum_{i=1}^{n} X_i$$

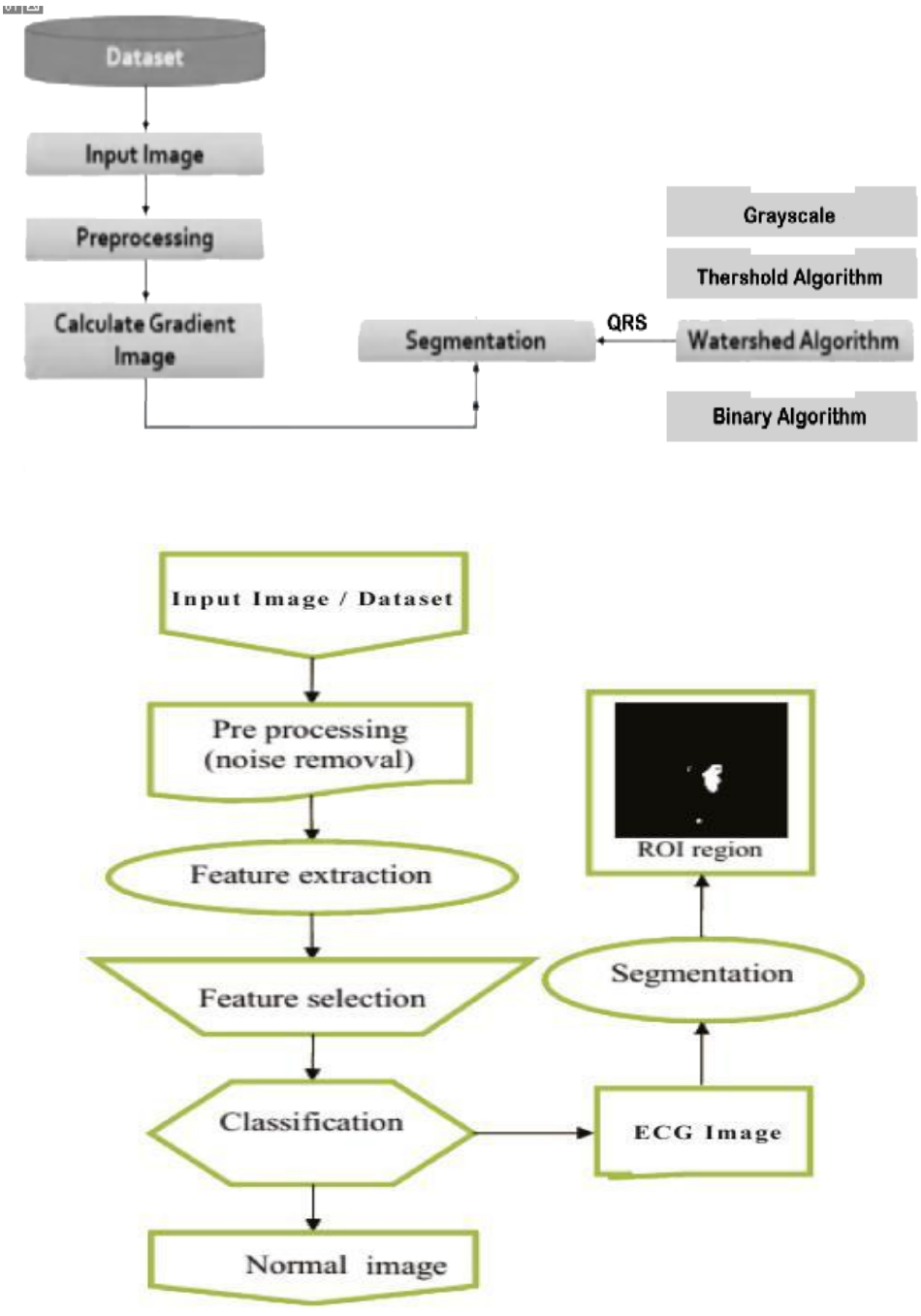


Figure: 2. System Design Proposal

Introduction

- ECG Neural Network Trained Data Sets
- Input Module / Upload the ECG Image
- Pre-Processing
- Segmentation Process
  - Grayscale Algorithm
  - Thershold Algorithm
  - Watersheld Algorithm
- Output Module.

ECG Neural Network Trained Data Sets

The ECG signal indicates the electrical activity of the heart. Variations in the amplitude and duration of the ECG signal from a predefined pattern have been used routinely to detect the cardiac abnormality. Because of the difficulty to interpret these variations manually, a computer-aided diagnosis system can help in monitoring the cardiac health status. Because of the nonlinear and non-stationary nature of the ECG signal, nonlinear extraction methods are good candidates for extracting the information in the ECG signal.

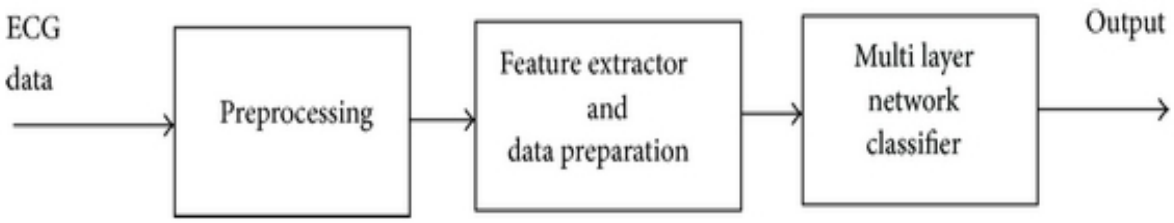
This module is used to train the signal into our project. This is nothing but, storage of signals. We have to store only the data into this module. This module only used to help us to find and train data for decision process.

Input Module / Upload the ECG Image

This module used to get the amplitude from the neural files which we are getting from ECG machine. We can give the details of patient and disease details here. This is our input module. This is to do the compare with the file which are trained in the previous module (Training) and detect the disorder with the use of neural network concepts. ECG image can be uploaded and stored into DB for further process.

ECG Pre-Processing

- Removing Noisy Data.
- Feature extractor is used to extract the data from the pre-processed data
- Classifier used for classification stages in ECG report



Segmentation Process

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments. The aim of segmentation is to simplify and/or change the symbol of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries lines, curves, and so on in images. More exactly, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The outcome of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region is similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s)

Used Algorithms

- WaterSheld
- Thershold
- Binary Imaging
- Grayscale

Watersheld

The term watershed refers to a ridge that divides areas drained by different river systems. A catchment basin is the geographical area draining into a river or reservoir. So how are watersheds and catchment basins related to analyzing biological tissue, studying galaxies, or researching new semiconductor technology? And what is the connection to image processing? The connection is through computer analysis of objects in digital images. The objects could be anything: blood cells, stars, toner spots on a printed page, DNA microarray elements, or even quantum semiconductor dots, as in this image.

System analysis the image objects starts with finding them-deciding which pixels (DPI) belong to each object. This is called image segmentation, the process of sorting out or separating objects from the background, as well as from each other. R. Gonzalez and R. Woods write in their widely used textbook (Digital Image Processing) that "segmentation of nontrivial images is one of the most

difficult tasks in image processing. Segmentation accuracy determines the success or failure of computerized analysis procedures."

For example, consider the image below, the watershed transform requires that you think of an image as a surface

Multidimensional Image Processing

A lot of the innovative and new Image Processing functions support multi-dimensional computation. The surfaces illustrated on the cover expand this binary image example to three dimensions. The graphics show 2 spherical touching objects, transparent surfaces of the distance transform, and the segmented result computed with the 3-D watershed transform.

Thershold

Optical scanning of the rock inscription yields an image (file of pixels) that forms the raw input to the Optical Character Recognition System. The output is the set of recognized characters.

Preprocessing is the first phase of document analysis. The purpose of preprocessing is to improve the quality of the image being processed. It makes the subsequent phases of image processing like recognition of characters easier. Thresholding is one of the preprocessing methods discussed in this paper. In thresholding, the color-image or gray-scale image is reduced to a binary image.

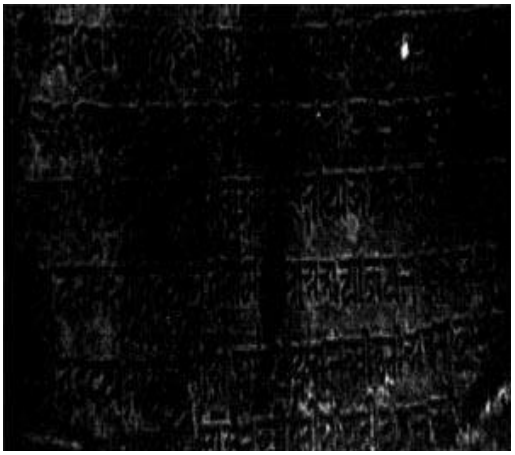


Fig. : An input image before thresholding (Pedestal)

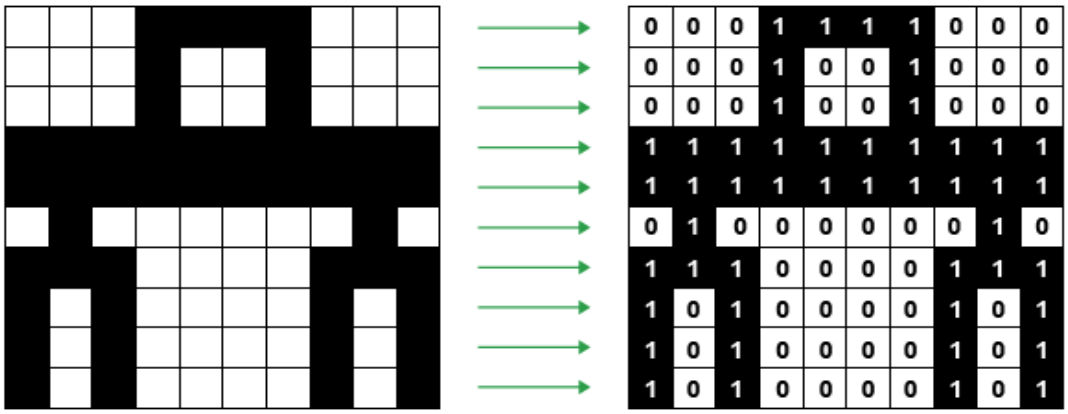
Binary Image Processing

Morphological image processing is a collection of non-linear operations related to the shape or morphology of features in an image. According to Wikipedia, morphological operations rely only on the relative ordering of pixel values, not on their numerical values, and therefore are especially suited to the processing of binary images. Morphological operations can also be applied to greyscale images such that their light transfer functions are unknown and therefore their absolute pixel values are of no or minor interest.

The basic effect of the operator on a binary image is to erode away the boundaries of regions of foreground pixels (i.e. white pixels, typically). Thus areas of

foreground pixels shrink in size, and holes within those areas become larger.

Morphological techniques probe an image with a small shape or template called a structuring element. The structuring element is positioned at all possible locations in the image and it is compared with the corresponding neighbourhood of pixels. Some operations test whether the element "fits" within the neighbourhood, while others test whether it "hits" or intersects the neighbourhood**:**



II. CONCLUSION

An ACO technique has been proposed to hold color image segmentation problem. It is an unsupervised method which tries to determine both number of clusters and optimum cluster centers. A simple cluster merging strategy has been also applied to tackle over segmentation problem after ACO-based clustering. The proposed method has been tested on two different datasets. Features such as area, parameter and eccentricity are calculated for detection of edges using watersheld, thershold and bianry imaging technique. Results on images of dataset show that the proposed method can be used for natural color images. On the other hand, the calculated accuracy of experiments health heart dataset clearly indicate that ACO-based clustering

Method can tackle flower region extraction problem in color images. Future Work It is significant to note that limit are selected arbitrary i.e (only using observation and parameters set which are used for solving other problems). Thus, we will try to make algorithm more stable and improve its performance. Also, we will more focus on segmentation of natural images, and the experimental and statistical results on Berkeley dataset will be represented in detailed.

III. REFERENCES

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