International Journal of Engineering Research and Technology. ISSN 0974-3154 Volume 10, Number 1 (2017)

NEURODEGENERATIVE DISEASES CLASSIFIED FROM EXTRACTION OF SALIENT BRAIN PATTERNS

Mr. Chetan. R. Patil.
M.E Student,D.Y. Patil College of Engg and Technology, kasaba bavda, Kolhapur, Maharashtra.

Prof. Dr. K. V. Kulhalli.
Vice Principal, D.Y.Patil College of Engg and Technology, kasaba bavda ,Kolhapur, Maharashtra

Abstract

Neurodegenerative diseases comprise a wide variety of mental symptoms whose evolution is not directly related to the visual analysis made by radiologists, who can hardly quantify systematic differences. This paper presents a new fully automatic image analysis method that reveals different brain patterns associated to the presence of neurodegenerative diseases, finding systematic differences and therefore grading objectively any neurological disorder. An accurate solution of Alzheimer's diseases based on saliency map characterization is carried out on database images. This paper gives fully automatic image analysis method and attempts an approach for classification of brain images to find out pathology and normality part of brain by extracting salient features of input brain image and the region of interest is identified using kernel k-means algorithm. A support vector machine (SVM) a supervised learning process is used for classification of AD, which is identified as blue color is normal brain part and red color is pathology related.

Keywords: Support vector machine(SVMs), Alziemher diseases(AD).

INTRODUCTION

Neurodegenerative diseases affect central nervous system. Neurodegenerative is combination of two words those are Neuro means "nerve cell" and Degeneration means "progressive losses". Overall definition of Neurodegenerative diseases is progressive loss of memory that includes loss of neurons and death of neurons intern that leads to loss of structure of nerve and functions of nerve. An Alzheimer's diseases start as small or mild and progressively it will get worse. The symptom of this disease includes loss of thinking skills, memory and behavioral changes. It starts in late middle age around 45 to 65 age groups or in old age and even it can affect any age group as well. In medical field, generally single magnetic resonance image are taken with consideration for disease analysis. At analyzing structural brain MR images, a main aim is to find anatomical changes related to functional disturbances. Single magnetic resonance may not show all the required parameters, so there is need of another modality image to diagnose better. By using anatomical interpretation we can combine relevant parameters of different modalities in a single image which will very helpful to physician. Anatomical interpretation is a process of combining the relevant information from a set of images of the same scene into a single image and the resultant fused image will be more informative and complete than any of the input images. Input images could be multi sensor, multimodal, multi focus or multi temporal. The fused image should preserve all relevant information from the input images. Image fusion algorithms can be on a feature levels. Feature level fusion algorithms operate on features extracted from the source images. Saliency map images are used to find particular patterns among the anatomical areas in the structural brain Magnetic Resonance (MRI) image typically used in identifying Alzheimer's diseases. Fused images can be performed with multiple images which of the same certain type of the information. So this combined information can be more helpful to diagnose the disease to doctor.

PROPOSED WORK:

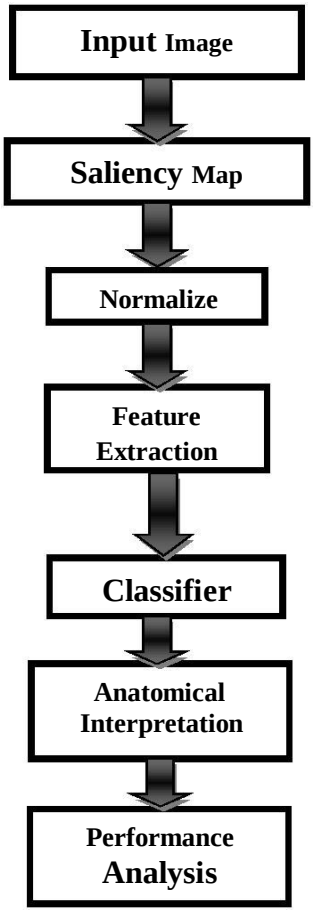

FIG 1

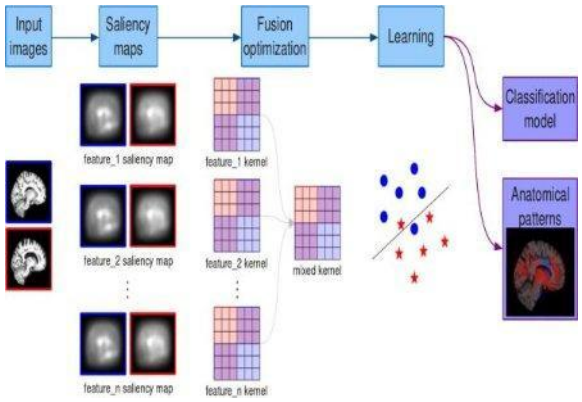

FIG 2

Fig. 1 and 2 shows Block diagram and Graphical overview of the proposed method. Different feature-scale saliency map extracted, then a learning algorithm fuses optimally this information to feedSVM classifier, to produce both a classification model as well as maps of relevant anatomical regions.

Methods

In this method implementation of the kernel function for feature extraction to identify the neurodegenerative Alzheimer disease in Brain Image. The input Brain image is converted to gray image and processed and saliency map image. After getting the saliency map image normalization of the saliency map is done and applying the kernel fusion to the normalize image to extract the feature of the image. Finally by using the SVM classifier to classify the feature value and identify the anatomical regions present in the brain image.

This work is carried out in following steps:

Saliency map

This module gives the saliency map of given input image that maps the each feature into its neighboring pixel feature so that degree of difference is calculated using Euclidian function. Each feature maps into a complete measure using saliency map that combines related information from single information into a global measure. Saliency typically calculated from contrasts between the given location and their neighborhood.

Normalization

Means changing the Intensity, Coordinates values, etc…., it is a process of changing the pixel intensity values. It is also called contrast stretching or histogram stretching. In normalization process same constant dimensions are identified and differentiated, so that it is used to produce anatomical regions.

Kernel Feature Extraction

Due to the increased popularity of the learning method which is known as Support Vector Machines uses kernel method for feature extraction. It is calculated in terms of kernel k-means method so that features can be extracted.

SVM Classifiers

Support vector machines are supervised learning model that associated with learning algorithms that used to analyse the data and identify the patterns which is used for classification process and map the trained data to classify accurately.

Anatomical interpretation

Red regions are pathology and blue regions are normality for identification of brain diseases. In this way anatomical interpretation is done.

Performance analysis

Performance analysis is based on accuracy, sensitivity and specificity is done.

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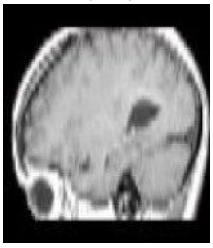
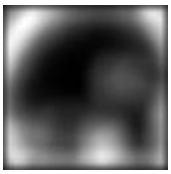
RESULT

INPUT IMAGE

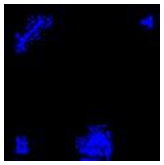


Saliency Image

Normalized Image



Anatomical Image



Pathology Image

Discusion

This paper has introduced a fully automatic strategy that stores structural brain patterns associated to neuro-degenerative diseases. Idea behind this is that it is possible to find the affected patterns that an expert Doctor might found in similar images. This is achieved by fusion stratergy which is acquired by kernel k- means method which stores structural brain patterns and SVM classifies the new image with the diseases affected image .

Conclusion

In this paper the accuracy is achieved using saliency map characterization and kernel k-means method is adapted which is very useful in differentiation of Neuro degeneration diseases with better accuracy. Thus red region in image describe pathology and blue region in image describe normality. And by using kernel k-means and svm method accuracy ,sensitivity and specificity acquired. In our opinion , for analysis and to determined the pathology area in image requires huge database of MRI image of brian , database should be compose of MRI scan image of neuro-

degenerative diseases and normal brain images so that genuine comparison done .So that at the end it should describe that the image is affected or not.

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