# Segmentation of Alzheimer Disease using SVM Algorithm

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*Abstract:* Alzheimer's disease (AD) plays an important role in the medical image processing. It is an irreversible neurodegenerative dementia that often occurs at the age of 65. It is a kind of memory loss that related with thinking and behavior of people's day to day lives. Therefore, the researchers are taking more efforts to find proper treatment and improve the quality of patient's life. This paper organizes120 subjects with normal and abnormal images in cognitive model. Therefore, it can be concluded that sensitivity as 78.5%, specificity 85% and accuracy as 90.2% using SVM algorithm.

*Keywords:* Alzheimer Disease, Segmentation of Alzheimer etc.

## I. INTRODUCTION

Brain is one of the important and complex organs in our human body which is located at the center of the nervous system. It consists of several billons of cells to communicate trillion connections like synapses. The brain includes some major task such as visualization, thinking, language processing, emotional response and learning. As it locates at the center of the nervous system, is there any abnormal behavior inside the cells it may affect our entire functionalities of the body which leads to Alzheimer's disease (AD). It is otherwise known as dementia that occurs often at the age of 65. It is a kind of memory loss with improper thinking and behavior, also in current progress there is no treatment for dementia. Thus, the experts are taking more effort to find the proper treatment and improve the quality of patient's life. To achieve this, some of the automatic development was progressed for the early detection of AD. It is one of the top 10 diseases in America that affects more than 5 million people of Americans and it may exceed up to 16 million people in 2050. The Alzheimer's disease was developed in the plaques and tangles of the brain, which leads to block the communication among the nerve cells, reduce its function and respective cells will die. Hence, the death of the nerve cells and distraction may cause memory failure and problem of changes in personal and daily activities [1].

In recent reviews, the segmentation based on different methods of aspects and it can be concluded in different ways. Following that, Jose Vicente Manjon, et.al, contributes some segmentation results using tissue classification in TMS method. It highlights the biomarker key in AD,temporal lobe atrophy are the early path physiological event that associated with early life

of patients risk factors [7]. Pier rick Coupe, et.al proposes methods of segmentation in life span analysis of brain trajectory using inferred models in AD that exhibits the early divergence between normal and pathological models [8]. The MRI images are used to detect the Alzheimer's disease with the help of neuroimaging Initiative (ADNI) dataset which obtains high accuracy with new biomarker images [9]. The following results are evaluated by ADNI datasets and determine the ability of the suggested biomarker with SVM algorithm for better results [10]. Then the limitations of previous analysis of neuroimaging in biomarkers were concluded in [11]. The evolution of brain Atrophy subtypes includes all types of segmentation methods that predict long-term cognitive decline and future clinical syndrome of Alzheimer's disease [12]. Frank de Vos, et.al, proposes anatomical measurements of MRIto increase the classification of AD into two different methods for combining the different measures offeatures [13]. The measure of all weighted combination is better than concatenated combination. These results may be to concatenate with the study of early diagnosis AD and other neurodegenerative diseases.

This paper represents the review and classification of Alzheimer's disease using SVM algorithm. Further, it organizesseveral datasets it consists of 161 subjects with AD and normal patients datasets. Finally, the results and graph are shown as below with accurate results.

## II. CLASSIFICATION

### SVM Algorithm

SVM is a supervised algorithm which consists of two stages: training and testing. The basic SVM takes a set of input data and predicts for each given input which of two classes forms the output, making it a non-probabilistic linear classifier as shown in the fig.1. It has ability grouping of all the classes in two disjoints groups of classes. This grouping is then used to train a SVM classifier in the root node of the decision tree, using the samples of the first group as positive examples and the samples of the second group as negative examples.
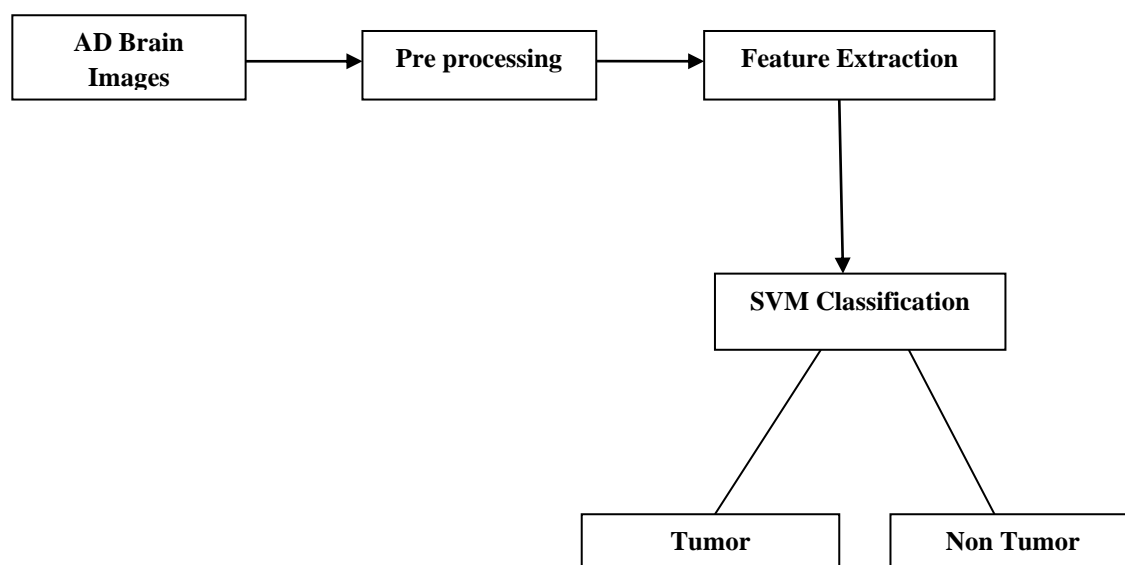


**Fig.1        Block diagram using SVM algorithm**

Table.1    Classification result analysis using SVM algorithm

| Classifiers | TN | FP | TP | FN | Sensitivity | Specificity | Accuracy |
|---|---|---|---|---|---|---|---|
| SVM | 45 | 10 | 52 | 12 | 78.5 | 85 | 90.2 |

## III.    RESULTS AND DISCUSSION

In order to develop a generalized network model, the training samples are randomly selected from the total samples of 120 datasets.In that, 60% of dataset has been used for training the neural network and the remaining 40% of dataset has been used to test the performances of the neural network using confusion matrix.

The performance analyses as shown in Table.1. It observes the values of accuracy, sensitivity, and specificity which obtained from the feature of SVM algorithm.

## IV.  CONCLUSION

Alzheimer's disease (AD) is otherwise known as Dementia which is most vulnerable disease in our human brain. Totally it consists of 120 subjects with normal and abnormal images in cognitive model.Hence, it can be concluded that sensitivity as 78.5%, specificity 85% and accuracy as 90.2% using SVM algorithm.

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