A Project/Dissertation Review-1 Report

on

BRAIN TUMOR DETECTION USING (CNN)

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1.Abstract

Brain Tumor segmentation is one of the most crucial and arduous tasks in the field of medical image processing as a human-assisted manual classification can result in inaccurate prediction and diagnosis. Moreover, it becomes a tedious task when there is a large amount of data present to be processed manually. Brain tumors have diversified appearance and there is a similarity between tumor and normal tissues and thus the extraction of tumor regions from images becomes complicated. In this thesis work, we developed a model to extract brain tumor from 2D Magnetic Resonance brain Images (MRI) by Fuzzy C-Means clustering algorithm which was followed by both traditional classifiers and deep learning methods. The experimental study was carried on a realtime dataset with diverse tumor sizes, locations, shapes, and different image intensities. In traditional classifier part, we applied six traditional classifiers namely- Support Vector Machine (SVM), K-Nearest Neighbor (KNN), Multi-layer Perceptron (MLP), Logistic Regression, Naive Bayes and Random Forest. Among these classifiers, SVM provided the best result. Afterwards, we moved on to Convolutional Neural Network (CNN) which shows an improvement in performance over the traditional classifiers. We compared the result of the traditional classifiers with the result of CNN. Furthermore, the performance evaluation was done by changing the split ratio of CNN and traditional classifiers multiple times. We also compared our result with the existing research works in terms of segmentation and detection and achieved better results than many state-of-the-art methods. For the traditional classifier part, we achieved an accuracy of 92.42% which was obtained by Support Vector Machine (SVM) and CNN gave an accuracy of 97.87%.

2. Introduction

Medical imaging techniques are used to image the inner portions of a human body for medical diagnosis. And medical image classification is one of the most challenging & affluent topics in the field of Image Processing. Medical image classification problems, tumor detection or detection of Cancer is the most prominent one. The statistics about the death rate from brain tumor suggest that it is one of the most alarming and critical cancer types in the Human body. As per the International Agency of Research on Cancer (IARC), more than 1,000,000 people are diagnosed with brain tumor per year around the world, with ever increasing fatality rate. It is the second most fatal cause of death related to Cancer in children and adults younger than 34 years [1]. In recent times, the physicians are following the advanced methods to identify the tumor which is more painful for the patients. To analyze the abnormalities in different parts of the body, CT (Computed Tomography) scan and MRI (Medical Reasoning Imaging) are two convenient methods. MRI-based medical image analysis for brain tumor studies has been gaining attention in recent times due to an increased need for efficient and objective evaluation of large amounts of medical data. Analysis of this diverse range of image types requires sophisticated computerized quantification and visualization tools. So, automatic brain tumor detection from MRI images will play a crucial role in this case by alleviating the need of manual processing of huge amount of data.

3. EXISTING SYSTEM:

In the existing technique, the Support Vector Machine (SVM) based classification is performed for brain tumor detection. It needs feature extraction output. Based on feature value, the classification output is generated and accuracy is calculated. The computation time is high and accuracy is low in SVM based tumor and non-tumor detection.

DISADVANTAGES OF EXISTING SYSTEM:

1)Accuracy is low.

2)More time is required to classify the result

4. PROPOSED SYSTEM:

1) In the proposed CNN based classification doesn't require feature extraction steps separately. The feature value is taken from CNN itself. The classified result of Tumor and Non-tumor brain image. Hence the complexity and computation time is low and accuracy is high. The output of brain tumor classification accuracy is given. Finally, the classification results as Tumor brain or non-tumor brain based on the probability score value. The normal brain image has the lowest probability score. Tumor brain has highest probability score value, when compared to normal and tumor brain.

ADVANTAGES OF PROPOSED SYSTEM:

1) The training accuracy is 97.5%. Similarly, the validation accuracy is high and validation loss is very low.

2) The usage of CNNs are motivated by the fact that they can capture / are able to learn relevant features from an image at different levels similar to a human brain. This is feature learning.

5. SYSTEM REQUIREMENTS:

HARDWARE REQUIREMENTS:

- System : Pentium IV 2.4 GHz.
- Hard Disk : 40 GB.
- Floppy Drive : 1.44 Mb.
- Monitor : 15 VGA Colour.
- Mouse : Logitech.
- Ram : 512 Mb.

SOFTWARE REQUIREMENTS:

- **Operating System:** Windows
- **Coding Language**: Python 3.7

6. UML Diagram