9 (9)

Research Article

Performance Analysis of Brain Tumor Detection and Diagnosis based on Optimized Features and SVM Classifier

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ABSTRACT

Magnetic Resonance Images (MRI) are widely used in the diagnosis of brain tumor because of its faster processing, avoiding malfunctions and suitability with physician and radiologist. This paper proposes a new approach to automated detection of brain tumor. This proposed work consists of various stages in their diagnosis processing such as preprocessing, image fusion, feature extraction and classification. The local binary pattern and wavelet features are extracted and these features are trained and classified using Support vector machine classifier. The achieved results and quantitatively evaluated and compared with various ground truth images. The proposed method gives fast and better segmentation and classification rate by yielding 97.25% of sensitivity, 99.99% of specificity and 99.91% of overall accuracy

KEYWORDS

MRI, Tumor, Classifiers, Ground Truth Image, Sensitivity, Specificity

1. INTRODUCTION

Brain tumor is one of the most dangerous diseases which require early and accurately detection methods, current used detection and diagnosis methods for image evaluation depend on decision of neuro-specialists, and radiologist which possible to human errors. Manual classification of brain tumor is time consuming. This paper describes the processes and techniques used in detecting brain tumor from magnetic resonance imaging (MRI) and ANN techniques, which are of the most application of artificial intelligent that used in biomedical image classification and recognition. There are more than 100 types of brain and spinal cord tumors (also called central nervous system or CNS tumors). They are usually named after the cell type they started in [2] but there are two basic kinds of brain tumors; primary brain tumors and metastatic brain tumors. Malignant tumors are primary tumors that usually grow rapidly and spread within the brain and spinal cord. Malignant brain tumors can also be life-threatening. About 40% of brain and spinal cord tumors are malignant [1]. Benign tumors are also primary tumors that are typically surrounded by an outer surface (fibrous sheath of connective tissue) or remain with the epithelium [2].Benign tumors usually have slow-growing cells and clear borders (margins), and they rarely spread. Whereas, Cancer cells that begin growing elsewhere in the body and then travel to the brain form metastatic brain tumors. For example, cancers of the lung, breast, colon and skin (melanoma) frequently spread to the brain via the bloodstream or a magnetic-like attraction to other organs of the body. All metastatic brain tumors are, by definition, malignant, and can truly be called "brain cancer" [3].

Imaging techniques are now a days most accurate abnormality detection methodologies as Magnetic Resonance Imaging (MRI) and Computer Tomography (CT). In this paper, MRI scanning techniques are used for brain abnormality detection in human brain due to its high visibility of abnormal patterns.

The grade of a tumor refers to the way the cells look under a microscope [4]:

Grade I: The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

Grade II: The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumor.

Grade III: The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).

Grade IV: The malignant tissue has cells that look most abnormal and tend to grow quickly.

In this paper, a computer aided automatic brain tumor detection and diagnosis technique is proposed using