**CHAPTER 1**

**INTRODUCTION**

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Tumor is an abnormal mass of tissue. Tumors can be benign or malignant (cancerous). There are hundreds of different types of tumors. Their names usually reflect the kind of tissue they arise in, and may also tell you something about their shape or how they grow. Diagnosis depends on the type and location of the tumor. Tumor marker tests and imaging may be used; some tumors can be seen (for example, tumors on the exterior of the skin) or felt (palpated with the hands).

A brain tumor occurs when abnormal cells form within the brain. There are two main types of tumors: malignant or non cancerous tumors and benign tumors.

Cancerous tumor can be divided into primary tumors, which start within the brain and the secondary tumors, which have spread from elsewhere, known as brain metastasis tumors.

All the types of brain tumors may produce symptoms that vary depending on the part of the brain that is affected. These symptoms may include headaches, seizures, problems with vision, vomiting and mental changes. The headache is classically worse in the morning and goes away with vomiting. Other symptoms may include difficulty in walking, speaking or with sensations. As the disease progresses, unconsciousness may occur.

Medical imaging plays a central role in the diagnosis of brain tumors. Early imaging methods- invasive and sometimes dangerous – such as pneumoencephalography and cerebral angiography has been abandoned in favour of non-invasive, high resolution techniques, especially magnetic resonance imaging (MRI) and computed tomography (CT) scans. Neoplasms will often show as colored masses in CT or MRI results.

* Benign brain tumors often show up as hypodense (darker than brain tissue) mass lesions on CT scans. On MRI, they appear either hypodense or isointense (same intensity as brain tissue) on T1-weighted scans, or hyperintense (brighter than brain tissue) on T2 – weighted MRI, although the appearance is variable.
* Contrast agent uptake, sometimes in characteristics patterns, can be demonstrated on either CT or MRI scans in most malignant primary and metastatic brain tumors.
* Pressure areas where the brain tissue has been compressed by a tumor also appear hyperintense on T2-weighted scans and might indicate the presence a diffuse neoplasm due to an unclear outline. Swelling around the tumor known as peritumoral edema can also show a similar result.

This is because these tumors disrupt the normal functioning of the BBB and lead to an increase in its permeability. However, it is not possible to diagnose high- versus low-grade gliomas based on enhancement pattern alone.

Hence it is necessary to identify it in earlier stages to improve the chances of successfully completing the treatment.

**1.1 BRAIN CANCER STATISTICS:**

A primary brain or spinal cord tumor is a tumor that starts in the brain or spinal cord. This year, an estimated 23,880 adults (13,720 men and 10,160 women) in the United States will be diagnosed with primary cancerous tumors of the brain and spinal cord this year. Brain tumors account for 85% to 90% of all primary CNS tumors. Also, about 3,560 children will be diagnosed with a brain or CNS tumor this year.

Brain and other nervous system cancer is the 10th leading cause of death for women. It is estimated that 16,830 adults (9,490 men and 7,340 women) will die from primary cancerous brain and CNS tumors this year.

The 5-year survival rate tells you what percent of people live at least 5 years after the tumor is found. Percent means how many out of 100. The 5-year survival rate for people with cancerous brain or CNS tumors is 34% for men and 36% for women. However, survival rates vary widely and depend on several factors, including the type of brain or spinal cord tumor. Talk with your doctor about what to expect with your diagnosis.

Brain cancer was the 18th most commonly diagnosed cancer in Australia in 2014. It is estimated that it will become the 17th most commonly diagnosed cancer in 2018.

In 2016, there were 1,439 deaths from brain cancer in Australia (878 males and 561 females). In 2018, it is estimated that there will be 1,435 deaths (856 males and 579 females). In 2018, it is estimated that the risk of an individual dying from brain cancer by their 85th birthday will be 1 in 157 (1 in 128 males and 1 in 200 females).

The number of new cases of brain cancer diagnosed increased from 853 (491 males and 362 females) in 1982 to 1,710 in 2014. Over the same period, the age–standardised incidence rate increased from 6.3 cases per 100,000 persons (7.5 for males and 5.1 for females) in 1982 to 6.7 cases per 100,000 in 2014.

The number of deaths from brain cancer increased from 391 (246 males and 145 females) in 1968 to 1,439 in 2016. Over the same period, the age–standardised mortality rate increased from 3.6 deaths per 100,000 persons (4.6 for males and 2.7 for females) in 1968 to 5.3 deaths per 100,000 in 2016.

**CONCLUSION**

Hence the proposed method for detecting brain tumor using convolutional neural network is used. Here the 3D video on the brain will be taken as input so that we can attain the exact shape of the tumor can be identified. For the access of image video is get converted into image Automatic defects detection in MR images is very important in many diagnostic and therapeutic applications. Because of high quantity data in MR images and blurred boundaries, tumour segmentation and classification is very hard. This work has introduced one automatic brain tumour detection method to increase the accuracy and yield and decrease the diagnosis time. The goal is classifying the tissues to three classes of normal, begin and malignant. . In MR images, the amount of data is too much for manual interpretation and analysis. During past few years, brain tumor segmentation in magnetic resonance imaging (MRI) has become an emergent research area in the field of medical imaging system. Accurate detection of size and location of brain tumor plays a vital role in the diagnosis of tumor. The diagnosis method consists of four stages, pre-processing of MR images, feature extraction, and classification. After histogram equalization of image, the features are extracted based on Dual-Tree Complex wavelet transformation (DTCWT). In the last stage, Back Propagation Neural Network (BPN) are employed to classify the Normal and abnormal brain. An efficient algorithm is proposed for tumor detection based on the Spatial Fuzzy C-Means Clustering.