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MRI Segmentation, Detection, Classification of Neonatal and Adults Brain tumor: A review

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Abstract — Nowadays, medical imaging research is growing and emerging movement towards computer vision domain. In particular, Brain tumor segmentation, detection and classification is the most difficult and tedious operation in medical image processing. Magnetic Resonance Imaging (MRI) is a technique which provides rich information about person soft tissues and helps in the diagnosis of brain tumor. This paper presents a review of existing neonatal and adults' brain tumor Segmentation, Detection and Classification methods and their limitations. Finally, the paper gives research directions and also could suggest a reasonable approach to achieve excellent implementation for the application of meditative examinations.

Keywords — Brain Tumor, Magnetic Resonance Images, Segmentation, Detection, Classification.

I. INTRODUCTION

Image processing is a methodology which is capable of converting an image into digital structure and it does certain actions on image data, to accomplish an augmented image or to extract vital information. From past ten years the researchers have proposed several neonatal and adults brain MRI segmentation, detection and classification methods; but there are notable differences in, each with respect to the complexity levels of datasets used, segmentation targets, characteristics and recognition. The analysis and review of both neonatal and adults brain MRI is of great interest due to its inherent growth patterns and morphological reshape in Central Nervous System (CNS) disorders.

The brain is one of the most complex and magnificent organs in the human nervous system. Clearly, central nervous system is composed of the brain and spinal cord. Specifically, Brain tumor is one of the major disorder; it can occur at any age, but are most common in newborn or neonatal, young and middle-age adults. Recently, Brain tumor has occurred approximately 1 million cases per year reported in India. Sources like, Apollo Hospitals (India), Columbia Asia Hospital (India), Harvard Medical School (USA), Albert Einstein Hospital (Brazil), World Health organization (WHO) and other medical advice association reported the ages affected by the Brain tumor. In addition, for each parental consent, according to their guidelines and local ethics describes the various age groups.

In view of Brain tumors, it can be classified as malignant (cancerous) or benign (non-cancerous). In the year 2016 the American Brain Tumor Association (ABTA) finds that malignant brain tumors are the most widely recognized reason for disease related deaths in youths and youthful grownups matured (15-39) and the most well-known growth happening among 15-19 year olds. Similarly, the National brain tumor society (NBTS) has assessed Normal survival rate for harmful malignant brain tumor adults' patients is around 34. 4% and pediatric (0-19 year's age) threatening malignant brain tumor is around 73. 6%. Throughout 1998 to 2014, there were 78 investigations, brain tumor medications that entered the clinical trial assessment procedure and also identified as 25:1 failures proportion for creating new brain tumor medicines over as far back as two decades.

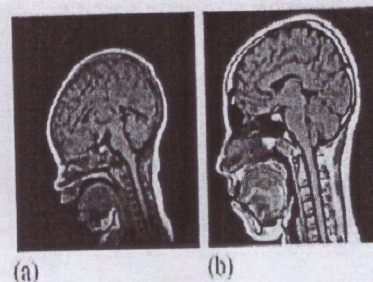


Fig. 1. (a) Neonatal brain (b) Adult brain.

In order to summarize and getting the best practice of brain images branched into neonatal and adult groups. Fig 1 illustrates the dissimilarity between a neonatal brain and adult brain. Brain tumors can also change as time goes by. They may become progressively more aggressive, another way tumor can be roughly divided into (1) neonatal Brain Tumors and (2) Adult Brain Tumors. Further, sub section A and B highlights the last 5 year survival rate for specific types of brain tumors of both groups.

A. Neonatal Brain Tumors

The most dominant forms of CNS abnormal growth malignancy in 0-4 year age group were gliomas (56.9%, especially astrocytomas). Table I highlights the survival rate of infants and very young children brain tumor types.