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GRADE CATEGORIZATION OF TUMOUR CELLS WITH STANDARD AND REFERENTIAL FRONTIER ALGORITHM

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ABSTRACT

Characterization of a brain tumor has an undoubted importance of the stages of initiations, in the medical ground. This report presents a novel method to sort out the tumors at different levels. Image processing techniques assist this terminology to eliminate the unproductive tasks of classifying and reduce the area under discussion. Background Separation, perimeter checks trim down processing regions, purging the total report of the patients. Established Standard and Growth Points over the tumor area would facilitate the characterization of shape, size and texture. Registered points label the tumor dated from the first stage. Corresponding points of later stages of the same patient would render the change in every aspect of the tumor under study. The proposed methodology is proven to be much efficient than other existing methodologies. The research involved a number of test cases, performance seemed to enhance in time required for classification. The decision of the system mentions the rate of growth and change in aspects straight enough with great accuracy and interpretability.

Index terms: Tumor grading system, Classification, Area and Perimeter property, Growth points, RGP.

I INTRODUCTION

Development of a disturbing tissue in brains and other secondary sites of human body, causing a fatal syndrome prove the demand of a standard system for classifying the tumors at different grades. The cells of the tumor develop in uncontrolled manner under the skull or spinal cranial. Certain types of tumors may spread from cancers. The tumors of malignant nature tend to proliferate to adjacent tissues, resulting in a widespread area of infection if avoided treatment. Factors such as cellular growth, size, shape, texture and intensity determines the seriousness degree of the tumor. The classification is based on the origin of the tumor cells, primary tumor cells begin to develop in different organs. Secondary brain tumors are stated to be metastatic which spreads from cancer cells of other organs. Cancer cells that originated from breast, lung and kidney flows upstream to the brain lie stagnant to develop

into secondary tumors of the brain. The destruction of brain cells continue from the invasion of these malignant or secondary tumors. On the other hand, classification can be on the conduct of those cells. The characteristics of the source and affected cells alter by a wide range from the normal operations. Basic functionalities of the cells are greatly disturbed by the changes in the composition of nuclei, plasma and cytoplasm. The ratio of the composition of each cell can be affected individually by the malignant tumor cells.

II THE RESEARCH METHOD

Pathologists review the tumor cells with distinctive steps to categorize the degree of concentration of tissue damage.. The recent methodologies include computer systems to process the input set of images (MRI), compare the differences or growth between them and finally

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output a particular decision. Pathologists believe the decision to be better than manual comparative methods.. This section discusses the previous methodologies of computer aided decision making systems in tumor grading. It is observed that the final decision proposed should be accepted and possess the risk of later useless rectifications.

EI Papagevgious et al. (applied soft computing 2008) used a fuzzy cognitive map technique to obtain the images, study and propose a decision on treating the malignant and benign grades of tumor. The authors discussed the theory with the expertise of clinical assessments of pathologists. They derived nine stages of results for the comparison of test images. Comprised of a map, with the matches of most feasible connection, the research provided results with an accuracy rate of 90.26% and 93.22% in malignant and benign tumor respectively.

Shafab Ibrahim and Noor Elaiza et al. evaluated the MRI images by framing them into mosaics and organizing them into shapes and sizes of brain abnormalities. PSO, ANFIS, FCM are used to segment the mosaic images formed. Statistical analysis method of receiver operating characteristic (ROC) was used to calculate the accuracy of the estimated results. The images are divided into specific regions of concentration; comparisons are made to produce the final decision.

Carlos A.Patta et.al proposed an artificial neural network algorithm to perform segmentation of the input brain tumor images. This enhanced model suggests better segmentation of the brain images and observation of affected tissues was facilitated with better quality and precision.

III THE REFLECTIVE PROCESS

(Fuzzy logic is a form of many-valued logic; it deals with reasoning that is approximate rather than fixed and exact. Compared to traditional binary sets (where variables may take on true or false values) fuzzy logic variables may have a truth value that ranges in degree between 0 and 1. Fuzzy logic has been extended to handle the concept of partial truth, where the truth value may range between completely true and completely false. The proposed methodology involves a series of preproduction processing which

assist in reducing the area of analysis. The MRI comprises of a image of brain surrounded by black matter, which is obvious waste of time and energy to introduce into the analysis processes. Similarly, the image of the brain beside the affected area need not be analyzed. The infected area alone can be differentiated by means of perimeter and area constraints of image processing techniques.

BACKGROUND SEPARATION

The images are obtained as a square form, with meaningless black matter surrounding the gray matter in the middle. The gray matter represents the structure of the brain, along with the tumor in specified regions in different shapes and sizes. Recorded results show a affected region as a deformed circle or abnormal circle like shapes. The first step is to eliminate the black matter and unaffected space of the brain from the tumor regions. By this, the resultant set of images to be subjected for analysis into the automated system would be regions of tumor. Separation of such images would render to save execution time to finalize the decision. Thresholding algorithm tends to eliminate the background from the foreground of specified intensity or color information. The output image could be obtained as the foreground or background alone. A parameter is the comparative element to be altered with the pixel of input images and altered with the intensity parameter on proving the condition to be true or false.

IMAGE SUBTRACTION

A single pass command have been devised to subtract the unwanted for or background regions in an image. Supplied with two images and pixel information of scalar (black and white) images, over the single pass, resultant image would readily display the regions useful for an analysis by a pathologist. The boundary metrics can be represented in arrays, constituting an image, and could be subtracted from the intermediate output image of thresholding algorithm. After the two consecutive steps of preprocessing the input MRI image of an affected patient would resemble the following image. The tumor has been clearly visible after the processing proposed in this research work. The border line

would be space which has been left out after assigning the pixel values into the algorithm.

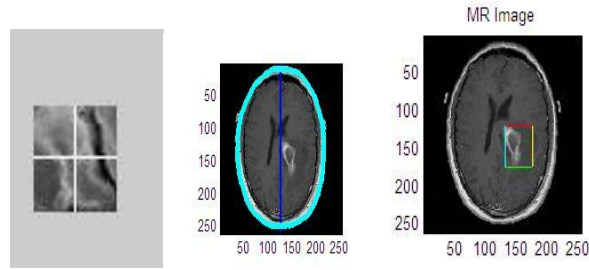


Fig 1.1

Fig 1.2

Fig 1.3

Figure (1.1) the tumor area which segmented into four quadrants. (1.2) the brain which is divided into two halves using the fuzzy logic technique. (1.3) shows the exact position of the tumor.

Implementation of Referential Growth Points and Standard Points

The proposed methodology involves the segmentation of the image into four quadrants. Each quadrant is marked by the axes of regular procedure. With the image of tumor mapped into the quadrants, at different stages, the proposed strategy clearly describes the growth of tumor cells with respect to repeated division and time. This proposed method

introduces a technique of analyzing the tumors based on the growth and shape metrics. The detected tumor would possibly be mapped to a comparative graph to predict the maximum accuracy. A tumor during the first report of the patient is registered as an input into the system. Subsequent reports are compared under the same name of the patient and stored for future comparisons.



Figure (1.4) the tumor variation in each stage

The shaded area shows how the tumor has been varied in each stage. The standard point marks the origin of the tumor, from which the tumor tends to be divisible and expand its size and shape in following weeks without treatments. Being a computer assisted system the standard point could always be allocated. It is clear that the referential Growth Points refers to the increment of tumor cells in certain periods. The standard point is a permanent metric from which the altered regions are compared with. The further week's reports will also be preprocessed and the additional growth could be

estimated numerically. The rate of growth can be evaluated which in turn assist a pathologist to recommend medications with predefined procedures by well qualified medical professionals. An additional advantage of this proposal is that, the shape could be mentioned in numerical attributes irrespective of a direction. This Grading system includes Eight Directional Referential Growth Points aiding it to be the efficient system to estimate the shape with a greater rate of accuracy.

4. EXPERIMENTAL ANALYSIS

The given graph shows a presentation of how the old and the current tumor characteristics differ with regards to each other.

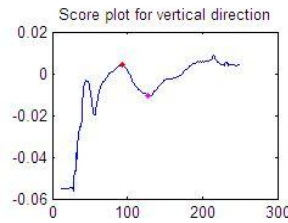


Fig (2.1)

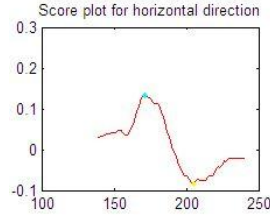


Fig (2.2)

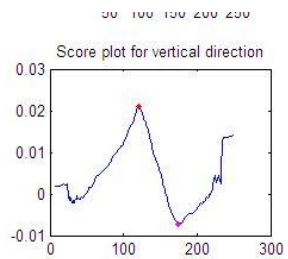


Fig (2.3)

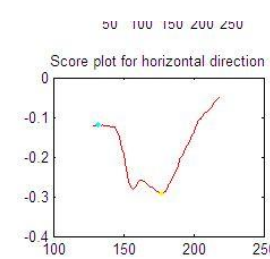


Fig (2.4)

The above graphs represent the growth of the tumor with respect to x axis and y axis. Two poles namely horizontal pole and vertical pole are shown in the above graph. The x axis represents the approximate line growth of the tumor and y axis represents the intensity of the tumor. These graphs are obtained as a resultant set from the Content-Based Retrieval and Fuzzy logic Techniques.

V DISCUSSION

The methods of Content-Based Retrieval and Fuzzy Logic implementation has been discussed in this paper. These methods yielded various results in the growth of the tumor level. Also the variations in the intensity of the tumor has also been discussed.

Thus these techniques explains clearly about the range of tumor level. The resultant outputs are found to be appropriate with respect to the growth and the intensity. Content Based Retrieval and Fuzzy Logic techniques seemed to be much efficient from other image retrieval techniques.

VI CONCLUSION

A tumor grading system, proposed in this paper is dedicated towards a designated system for characterization of life threatening brain tumor cases. The system provided and advised the suitable treatment plans with respect to the growth metrics. Similarly a system to automate the intensity factors could be developed to be a universal solution for the pathologists in helping the mankind. Although there is no specific or singular clinical symptom or sign for any brain tumors, the presence of a combination of symptoms and the lack of corresponding clinical indications of infections or other causes can be an indicator to redirect diagnostic investigation towards the possibility of an intracranial neoplasm. Brain tumors have similar characteristics and obstacles when it comes to diagnosis and therapy with tumors located elsewhere in the body. However, they create specific issues that follow closely to the properties of the organ they are in. After discussions of existing systems and standards, the new method is believed to overcome the obstacles of previous strategies.

REFERENCES

- [1]. E.I.Papageorgiou, P.P. Spyridonos, et.al,” Brain Tumor Characterization using the soft computing Technique of fuzzy cognitive maps” ,ELSEVIER-applied soft computing-2008-820-828
- [2]. E.I.Papageorgiou, P.P. Spyridonos, et.al, “advanced soft computing diagnosis method for tumor grading”-ELSEVIER-2006-59-70
- [3]. Tao Wang, Irene Cheng, “Fluid Vector Flow and Applications in Brain Tumor Segmentation”-2009-IEEE Transactions on Bio medical Engg, Vol-56. NO.3, March 2009
- [4]. Yan Zhu and Hong Yan,”Computerized Tumor Boundary Detection Using a HopField Neural Network”, 1997-IEEE Transactions On Medical Imaging, Vol-16, No-1, page:55-67
- [5]. Matthew C.Clark, Lawrence O.Hall ,” Automatic tumor segmentation using Knowledge based techniques,”IEEE transactions on medical imaging, vol 17, No 2, April 1998
- [6]. Charanpal Dhanjal, Steve R. Gunn, and John Shawe-Taylor, “Efficient Sparse Kernel Feature Extraction Based on Partial Least Squares” IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 31, No. 8, August 2009
- [7]. Shafaf Ibrahim, Noor Elaiza Abdul Khalid,” Image Mosaicing for evaluation of MRI Brain Tissue abnormalities segmentation study”,Int.J.Biology and Biomedical Engineering, issue 4, volume 5, 2011, pp 181-189.
- [8]. K.M. Iftekharuddin, “On techniques in fractal analysis and their applications in brian MRI”, in: T.L. Cornelius (Ed.), Medical imaging systems: technology and applications, Analysis and Computational Methods, vol. 1, World Scientific Publications, 2005, ISBN 981-256-993-6.
- [9]. J.C. Bezdek, L.O. Hall, L.P. Clarke,” Review of MR image segmentation techniques using pattern recognition”, Med. Phys. 20 (4)(1993)1033-1048.
- [10]. DevrimUnay and Ahmet Ekin et.al.,” Local structure based region of interest retrieval in Brain MR images”, IEEE Transactions on Information Technology in biomedicine, Volume 20,January 2009.
- [11]. Islam, A, Reza. S.M.S, Iftekharuddin, K.M. et al., ”Multi fractal Texture Estimation for detection and Segmentation of Brain Tumors”, IEEE Trans Biomedical Eng. Nov. 2013
- [12]. Dr Mohammad. V. Malakooti, Seyed Ali Mousavi, et.al “MRI Brain Image Segmentation Using Combined Fuzzy Logic and Neural Networks for Tumor Detection” Journal of Academic and Applied Studies Vol. 3(5) May 2013, pp. 1-15
- [13]. Anjum Hayat Gondal, Muhammad Naeem Ahmed Khan,” A Review of Fully Automated Techniques for Brain Tumor Detection From MR Images”- I.J.Modern Education and Computer Science, 2013, 2, 55-61
- [14]. M. Egmont-Petersen, D. de Ridder et.al” Image processing with neural networks”- ELSEVIER- The Journal of the Pattern Recognition 35 (2002) 2279–2301