ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Brain Tumor Detection Based on Watershed Transformation.

Ramya K* and Joshila Grace LK.

Department of Computer Science and Engineering, Sathyabama University, Chennai, Tamil Nadu, India

ABSTRACT

In this paper, a watershed transformation technique is used with gradient magnitude with morphological open image and two important features is used as foreground and background to identify the tumor. First the Magnetic Resonance imaging(MRI) Scan of tumor is given as an input and it undergoes into watershed technique which is a topological boundary dividing into two adjacent brain cells. With the gradient magnitude for segmentation technique the rate of inclination or declination of a tumor will be identified. To identify the foreground of the tumor, open the image morphological, thus it acquires clear idea about how the particular tumor will be closer to normal cells. With the background marker, the invisible tumor will be identified using threshold value. In the segmentation output finally, the intensity, size, shape of the tumor in the brain is displayed and can be analysis.

Keywords: Background, Foreground, Gradient Magnitude, Morphology, Magnetic Resonance Imaging, Watershed Transformation.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Brain Tumor is formed of an abnormal cells. Brain Tumor can be malignant as cancerous and benign as non-cancerous. When they are growing inside the skull the pressure will be high. Therefore brain will get damaged or even it may cause the death. Fig. 1.The fact of brain tumor is, 63%of tumor will be as benign and the remaining 37% will be malignant i.e., cancerous, everything can be categorized as primary, secondary brain tumor. First the affected region of the tumor will be found out with the affine transformation registration process. This region will be partitioned as a segment. These segments of the tumor will go in depth, width, with the PNN, by doing this cavity of resection more and more problem can be found out with overlapping intensity and quality of the tumor.

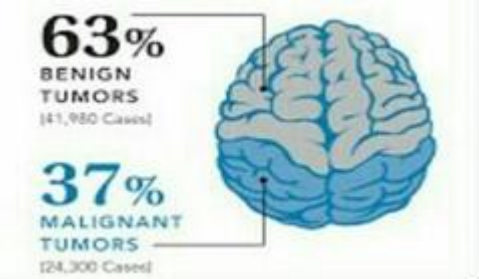

Fig 1: Fact of Brain Tumor.

Symptoms -The symptoms of the brain tumor is Fig. 4.Headache, vomiting, eye problem, ear-problem, Fig. 2.Unable to walk and write, drowsy, Fig. 3.Mobile phone radiation ear-problem.

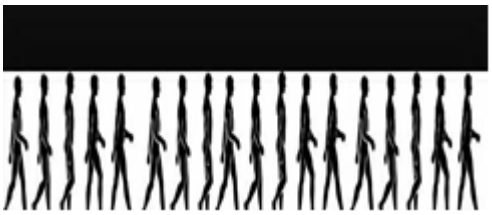

Fig 2: Unable To Walk.

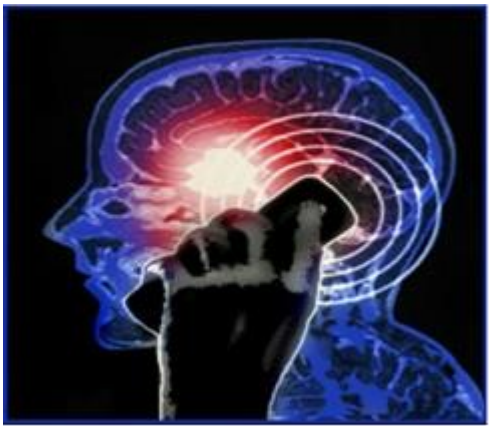

Fig 3: Mobile Phone Radiation.

ISSN: 0975-8585

Fig 4: Handwriting, Vomiting, Eye problem, Headache.

LITERATURE SURVEY

The stric should be align first for preoperative feasible approach to discover the post recurrence of the MRI [2] scan by analyzing the characteristic of the [3] image will be the brain cell.[4][5]The recurrence subsequent of the tumor and infiltration are predict accurately for the benefit of gliom as treatment by image discover of gliom as treatment by image discover.[6][7]Method of registration deals pathological mapping process with brain segmentation scan by the corresponding missing issue.[8]By the method of mathematical correction less blood vessels of density in tissue of brain is proportional to gaddinium the regions of leak is severe.[9]The machine learning methods is used with parametric combination to analysis the data with grading brain tumor as well as more techniques of sophisticated to predict the outcomes in clinical integration.[10]By training and testing with normal and adnormal cells with the classification of network. [11] Using MRI is not feasible, it produced physiological data with relevance to clinical. It will be highly complex for the post-treatment of tumors, but the merit is the time, techniques of image in the function of the MRI will be established easily using diverse therapy it will detect the disease recurs. [12] With less member of patients co-registration and morphological image with high resolution will enhance the differentiation in-between the tissue of tumors, but it is under the investigation into MRI registered image. [13] Based on a system of Teleradiology with personal digital assistant as wireless access point. Here filtering is based on the spatial techniques. While analysis with PNN classifier. This is capable of receiving, loading, processing and analyzing the hi-quality static MRI. [14] It identifies the abnormal and uncontrolled of the tumor, with curve fitting and algorithm of genetic for the use of segmentation. For the classification of tumor and non tumor SVM has been used.

[15]With different fields this research is proceeding with the data in CT. The problem is very complex in segmentation. Ad several part brain is disunited, especially with tissues in the brain. Though the segmentation is important depend on the same character in MRI. This will be flexible to find the boundary and the position of the glioma.[16]Raw image is represented in the form of pattern classification to decision making. With large database this technique is proposed for effective and robust.LDA and PCA techniques used to decrease the total count of feature which have been used.[17]decomposition of wavelet 2-D discreate is preformed on image tumor for removing the noise the ground truth of radiologist by the experienced treatment, Segmentation is performed analysis of quantitative in between the segment and ground truth is represented with accuracy and error.[18]tumor cells structure is very complicated to uncovered brain tumor. So sorting method is used for identifying the anatomical structure function with ratio based combining PNN to classify the brain tumor automatically with GLCM and with FDCT(feature extraction)and PNN-RBF classification all this combined and turned into training the MRI for judgement terminal shape but the testing was fail for some people with detecting and accuracy.[19] For the purpose of stage classification and detection of the glioma is proposed with the method of the glioma is proposed with the method of k-means clustering.

Though the structure is very complicated it act has challenging problem. The anatomical structure is segmented by MRI for identification ANN is used to classify the brain tumor types. Segmentation by CAD decision making is performed in the future by training and classification of the performance and accuracies.[20] The activity of the brain is measured with multiple task caused by the complexity of the tumor. To classify the efficient it works on the SVM and this technique is compared with ANNs. i.e artificial neural network. The quality will be better then ANN, the potential huge for the treatment and diagnosis of this tumor.[21]the method of classification operator impractical for this data with more amount, the capability with be very high in speed and the computational will be very low all this is performed with 2 steps i.e. the discrete cosine transformation using extraction feature dimensional reduction and with classification using PNN.[22]Healthy population for the atlas for tumor in prior of inject.[23]In non rigid area has the tumor grow which archety by this extend of registration, the pathology and also healthy tissue resembles as deformed in atlas.[24]optimization with multiple objective with image registration is presented. This deals with many type of problem which is much more difficulty. It will addressed the issue in the tissue of brain due to identification in separate task. It is based on model evolutionary with raising of intensity similarity with normalize some relationship information and also minimization of energy requires to accomplish the transformation. With raising of intense as same appearance with normalized as same relationship and also lowering of energy is needed for transformation.[25] For the purpose of clinical usage the method with relative quantification by the fusion of sophisticated technique.

EXISTING METHOD

In existing the method used is Deformable registration this plays an important problem in medical for Image registration. In the clinical diagnosis, there are many ability applications are available like cardiac, pelvic, retinal, renal, liver, abdomen, tissue, are Diagnosis disorders. In system of common co-ordinate two images to process of changes in order to monitor subtle in the intermediate of two images. Thus compute transformations in Registration algorithms to set the corresponding intermediate between two images. The location is very difficult to identify in MRI And also Implementation is highly complicated.

PROPOSED METHOD

In the watershed system first the MRI sweep of the human cerebrum is preprocessed into a middle channel, i.e, It de-modularized and modularized the picture by the interior component extraction with closer view and foundation to recognize the tumor by the morphological open picture. A watershed is a bowl like a landform characterized by highpoints and ridgelines that slide into the tumor distinguishing proof with slope magnitude. Thus the Local minima of the glioma's inclination picture may be picked as markers, for this situation an over-division is produced. Then further it experiences into particular marker positions which have been either expressly characterized by the client or decided consequently with morphological administrators by opening the picture to recognize the closer view of the tumor. With the assistance of foundation marker the edge estimation of tumor will be determined. Then further it experiences in the change procedure like turn, shearing, scaling, zooming. The last fragmented yield of the tumor will be made sense of.

METHODOLOGY

PRE-PROCESSING

First the tumor image of the MRI as an input is given. It is a high frequency process, in this median filter is used to filter the noise of low frequency for smoothing the image by Fig. 5.Calculating the neighbor pixel.

WATERSHED TRANSFORMATION

Is a transformation of pixel which descend the tumor. Fig. 6. It consists of gradient magnitude for transforming the image as the ocean. This watershed is useful for the value of higher intensity. This is used in image processing primarily for segmentation purposes. The Technique for segmenting digital images that use a type of region growing method based on an image gradient. Gradient descent defines segmented regions which is set of all pixels whose paths of curvy descent terminate in similar local minimum and it is bounded by image feature.

ISSN: 0975-8585

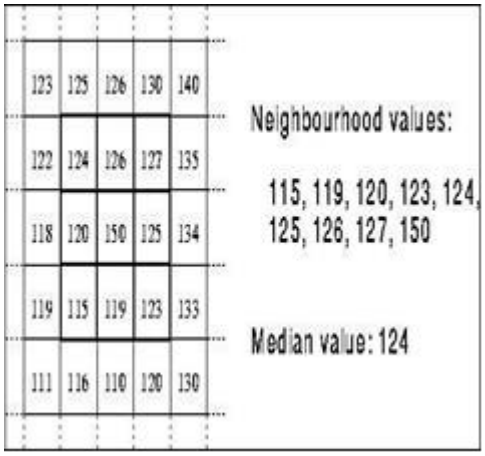

Fig 5: Example-Calculating the median value of the pixel.

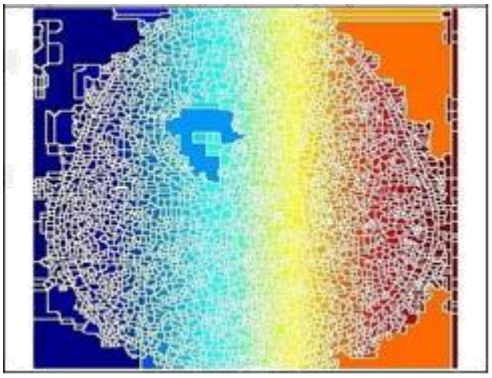

Fig 6: Watershed transformation.

TRANSFORMATION

This is used to rotate the image of the tumor also shearing, zoom, scale the tumor of MRI scan Fig. 8.So that every tumor will be visible clearly. With 12 parameters, the differentiation of affine transformation by exact position and also the size of the image.Fig.7.All the parameter will be represented by the translation, rotation, shears and zooms. Each and very will have 3 parameters.

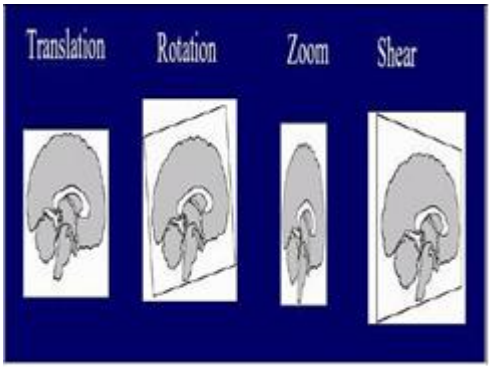

Fig 7: Transformation.

ISSN: 0975-8585

This transformation will have certain procedures, i.e., Linear and non-linear. This linear transformation is the affine of 12 parameters. It will be constrained by the framework of Bayesian by the extent deformation of Bayes rule

$p(p|e) \mu p(e|p)\ p(p)$
It is based on the prior range of empirical
$X = S[x\cos(\theta) + y \sin(\theta)] + tx,$
$Y = S[-x \sin(\theta) + y \cos(\theta)] + ty.$
Where, S represents scaling,
tx, tyre present displacements in x and y direction
θ represents the rotation angle.
Displacement of ty, tx is the direction of x and y
Affine transformation is preserved
$F(\alpha_1 p_1 + ... + \alpha_n p_n) = \alpha_i F(p_1) + ... + \alpha_n F(p_n)$
Where $p_i = \sum_{i=1}^{n} \alpha_i = 1$

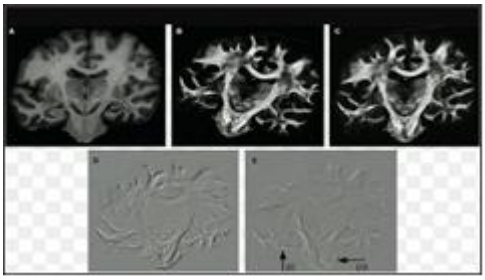

Fig 8: MRI Scan of Transformation.

THRESHOLD

This is a simple calculation method to find the tumor with their pixel values in the clip level of segmentation. This converts the gray scale level into a binary image. So that with the background marker, the invisible tumor will be identified using threshold value.

MORPHOLOGICAL

The gradient of the Local minima tumor is chosen as markers. It produced an over-segmentation in this event which involves the region merging. In a clear way automatically with morphological operators a position with specific marker is determined by the watershed transformation marker. This is used to identify the foreground of the tumor, open the image morphological, and thus it acquires clear idea about how the particular tumor will be closer to normal cells.

BACKGROUND MARKER

The invisible tumor will be identified using threshold value. It goes very deeper to find the background tumor.

SEGMENTED OUTPUT

Finally the output of the tumor, which is the tumor will be displayed separately from the brain and so that's the size, shape, intensity can be measured and analysis as very accurately and exactly.

ISSN: 0975-8585

EXPERIMENTAL AND RESULT

PRE-PROCESSING

Which gets the Fig. 9. Noisy image as an input and filter it by removing the noise from high frequency and Fig.10. It improves its efficiency.

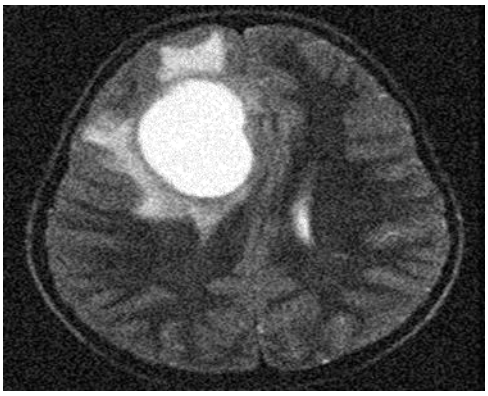

Fig 9: Noisy Image.

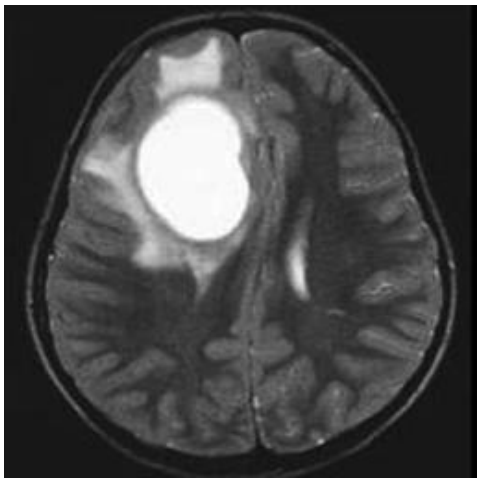

Fig 10: Pre-Processing

WATERSHED

Here this filtered input image is fed into the transformation as Fig. 11. Very deeper into the pixel of the tumor.

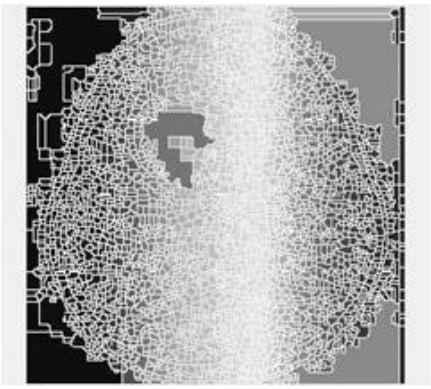

Fig 11: Watershed Transformation.

ISSN: 0975-8585

TRANSFORMATION

The transformation is done with the Fig. 12.process of rotation, shearing, translation, zooming. So that the shape of the tumor will be useful for detection.

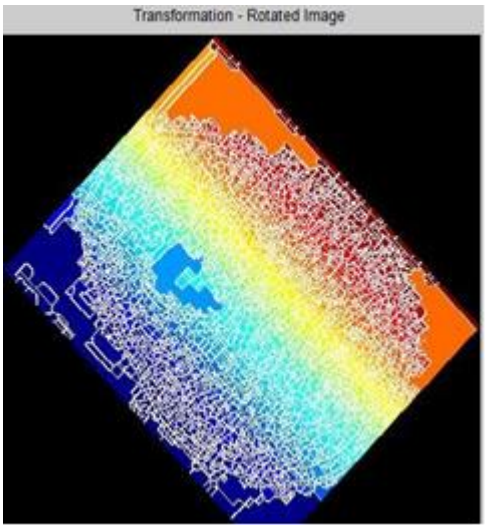

Fig 12: Rotation.

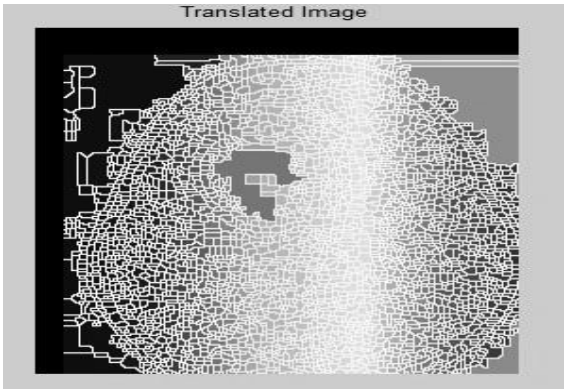

Fig 12: Translation.

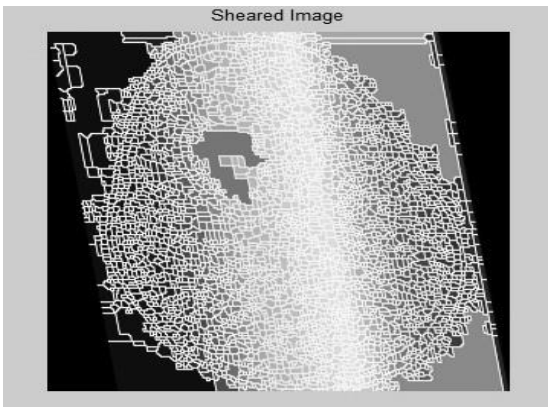

Fig 12: Shearing

ISSN: 0975-8585

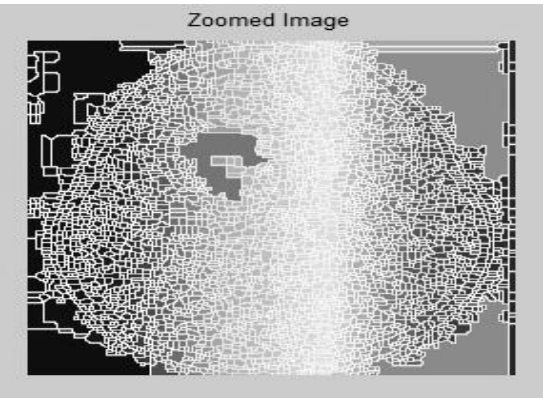

Fig 12: Zooming

THRESHOLD

This is one of the simplest way to detect the tumor, which is based on the Fig. 13. Threshold value, which convert gray scale to binary.

Fig 13: Threshold

MORPHOLOGICAL

It opens the image Fig.14.Very clear to identify the foreground of the image.

Fig 14: Foreground.

BACKGROUND MARKER

ISSN: 0975-8585

The Fig. 15.invisible tumor will be identified using threshold value.

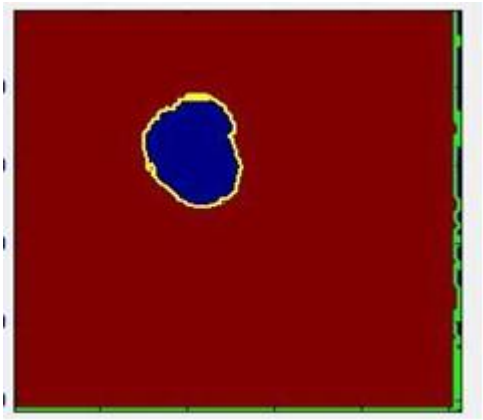

Fig 15: Background

SEGMENTATION OUTPUT

Finally, the intensity, size, shape of the tumor Fig. 16. The brain is displayed and can be detected accurately

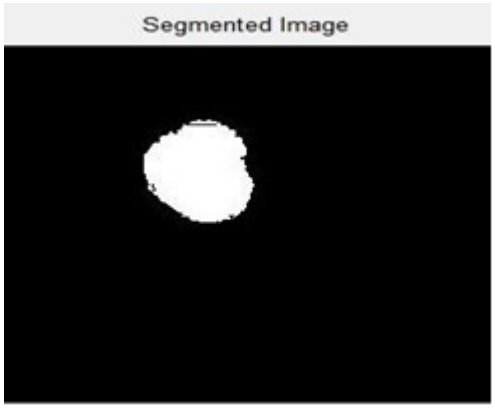

Fig 16: Segmented Output

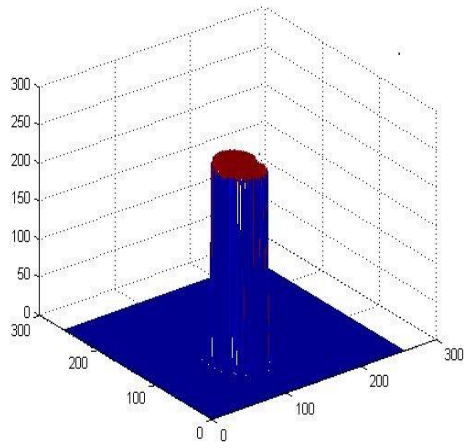

Fig 16: 3-D Segmented Output

ISSN: 0975-8585

CONCLUSION

Brain tumor detection based on watershed transformation is proposed with the gradient magnitude to elaborate the pixel, along with morphological operation to open the image very clearly. Before that threshold value of the glioma is measured by the foreground and background marker. Finally the segmented output can be viewed with the depth, width, intensity, overlapping of the tumor will be displayed and detect very effectively and gives 99.99 efficiency to determine the tumor of the human brain.

REFERENCES

[1] Dongjin Kwon, Marc Niethammer, HamedAkbari, Michel Bilello, Christos Davastzikos, "PORTR: Preoperative and Post RecurrenceBrain Tumor Registration," IEEE Transaction n Medical Imaging,Vol.33, No. 3, March 2014.

[2] D. Waldman, A. Jackson, S. J. Price,C.A. Clark, T.C.Booth,D. P.Auer, P.S. Tofts, D. J. Collins, M. O. Leach, and J. H. Rees, "Quantitativeimaging biomarkers in neuro-oncology," Nat. Rev. Clin. Oncol.,vol. 6,no. 8, pp. 445–454, 2009.

[3] J. M. Provenzale, S. Mukundan, and D. P. Barboriak, "Diffusionweighted and perfusion MR imaging for brain tumor characterization and assessment of treatment response," Radiology, vol. 239,no. 3, pp.632–649, 2006.

[4] W.-D. Heiss, P. Raab, and H. Lanfermann, "Multimodality assessment Ofbraintumors and tumor recurrence," J. Nucl. Med., vol. 52, no.10,pp. 1585–1600, 2011.

[5] S. J. Price, R. Jena, N. G. Burnet, T. A. Carpenter, J. D. Pickard, and J.H. Gillard, "Predicting patterns of glioma recurrence using diffusiontensor imaging," Eur. Radiol., vol. 17, no. 7, pp. 1675–1684, 2007.

[6] M. Niethammer, G. L. Hart, D. F. Pace, P. M. Vespa, A. Irimia, J. D. V.Horn, and S. R. Aylward, "Geometric metamorphosis," in Proc.MICCAI, 2011, vol. 6892, pp. 639–646.

[7] S. Periaswamy and H. Farid, "Medical image registration with partial data," Med. Image Anal., vol. 10, no. 3, pp. 452–464, 2006.

[8] Kathleen M Scmainda, "Diffusion-weighted MRI as a biomarker for treatment response," 10.2217/CNS.12.25 2012 future medicine LtdISSN 1045-0907.

[9] Patricia Svolos1, Evanthia Kousi1, EftychiaKapsalaki, KyriakiTheodorou, IoannisFezoulidis, ConstantinKappas and Ioannis Tsougos1Svolos et al."The role of diffusion and perfusion weightedimaging in the differential diagnosis of cerebral tumors," a review and future perspectives, Cancer Imaging 2014.

[10] P.Sangeetha"Brain Tumor Classification Using PNN And Clustering," International Journal of Innovative Research in Science, Engineeringand Technology Volume 3, Special Issue 3, March 2014.

[11] K. M. Pohl, J. Fisher, J. J. Levitt, M. E. Shenton, R.Kikinis, W. E.L. Grimson, and W. M. Wells, "A unifying approach toregistration,segmentation, and intensity correction," in Proc. MICCAI, 2005, vol.3749, pp. 310–318.

[12] K. M. Pohl, J. Fisher, W. E. L. Grimson, R. Kikinis, and W. M.Wells, "A Bayesian model for joint segmentation and registration,"NeuroImage, vol. 31, no. 1, pp. 228–239, 2006.

[13] PantelisGeorgiadis, Student Member, IEEE, DionisisCavouras,"PDA-based system with teleradiology and image analysis Capabilities XMember".

[14] AntonisDaskalakis,KoraliaSifaki, MenelaosMalamas, George Nikiforidis and EkateriniSolomou,RGPV "genetic algorithm employed to detect brain tumor in mri image", International Conference on Cloud, Big Data and Trust 2013, Nov 13-15.

[15] Narkhede Sachin, Dr.Deven Shah, Prof. Vaishalikhairnar, Prof. SujataKadu " Brain Tumor Detection Based on Bilateral Symmetry Information"G (Student ME (IT) Mumbai University)Narkhede Sachin et al Int. Journal of Engineering Research and ApplicationsISSN : 2248-9622, Vol. 4, Issue 6(Version 3), June 2014, pp.98-103

[16] V.P.GladisPushpaRathi and Dr.S.Palani Department of Computer Science and Engineering,"braintumormri image classificationwith feature selection and extractionusing linear discriminant analysis"Sudharsan Engineering College Sathiyamangalam, Pudukkottai , India.

[17] A.Padma, Research scholar, Thiyagarajar College of Engineering Dr.R.SukaneshProf of Electronics and Communication Engineering "A Wavelet Based Automatic Segmentation of Brain Tumor in CT Images Using Optimal Statistical Texture Features".

[18] Nitish Zulpe1 and VrushsenPawar College of Computer Science and Information Technology," GLCM Textural Features for Brain Tumor Classification"Latur-413512 Maharashtra, India.

[19] Swapnali Sawakare1 and Dimple ChaudhariSwapnaliSawakare, Electronics and Telecommunication/ Y.T.I.E.T/ Mumbai University, Neha A.P.T, G-1 blk.no."Classification of Brain Tumor Using Discrete"Wavelet Transform, Principal Component Analysis and Probabilistic Neural Network"460/919 A bhd. Lalchakki (Ulhasnagar-4) India.

[20] Anil kumar al-falahuniversity,Faridabad,vinaykumarsinghalECE,Hindu college of engg.sonepat" A Comparative Study of Two MRI Brain Tumor Classification Techniques "brain tumor, MRI, SVM, neural network, classification.

[21] P.Sangeetha "Brain Tumor Classification Using PNN And Clustering" International Journal of Innovative Research in Science, Engineering and TechnologyVolume 3, Special Issue 3 March2014.

[22] B.H.Menze, K. V. Leemput, A. Honkela, E.Konukoglu,M.-A.Weber,N. Ayache, and P. Golland, "A generative approach for image-based modeling of tumor growth," in Proc. Inf. Process. Med. Imag., 2011,vol. 6801, pp. 735–747.

[23] A. Gooya, K. M. Pohl, M. Billelo, L. Cirillo, G. Biros, E. R. Melhem,and C. Davatzikos, "GLISTR: Glioma image segmentation and registration,"IEEE Trans. Med. Imag., vol. 31, no. 10, pp. 1941–1954, Oct.2012.

[24] TanjaAlderliestena, Jan-JakobSonkea, Peter A.N.Bosmanb"Multi-objective optimization for deformable image registration": proof of concept Dept. of Radiation Oncology, The Netherlands Cancer Institute - Antoni van LeeuwenhoekHospital (NKI-AVL), P.O. Box 90203, 1006 BE Amsterdam, The Netherlands;bCentrumWiskunde&Informatica (CWI), P.O. Box 94079, 1090 GB Amsterdam, The Netherlands.

[25] Wolf-Dieter Heiss, Peter Raab, and Heinrich Lanfermann "Multimodality Assessment of Brain Tumors and Tumor Recurrence" Max Planck Insitute for Neurological Research, Cologne, Germany; and Institute for Diagnostic and Interventional Neuroradiology, Hannover Medical School, Hannover, Germany.