



# IJEAST

INTERNATIONAL JOURNAL  
OF ENGINEERING APPLIED SCIENCE  
AND TECHNOLOGY



**VOLUME : 6    ISSUE : 1    Print / Issue Publication Date: 08-Aug-2021**



**ISSN : 2455-2143**



**DOI : 10.33564/IJEAST.2021.v06i01.057**

Indexed In



[WWW.IJEAST.COM](http://WWW.IJEAST.COM)

[editor@ijeast.com](mailto:editor@ijeast.com)



# AUTOMATIC SEGMENTATION AND CLASSIFICATION OF BRAIN TUMOR USING DEEP LEARNING

K.Ganga Durga Prasad, A.J.N.Murthy, G.Narasimha, New Sinha  
1V/II, B.Tech.

Department of Electronics and Communication Engineering,  
Godavari Institute of Engineering & Technology (A), Rajahmundry, Andhra Pradesh, India.

**Abstract:** The brain tumors, are the maximum not unusual place and threatening disease, main to a totally quick lifestyles of their maximum grade. Thus, remedy making plans is a key level to enhance the lifestyles of sufferers. Normally, distinct photo strategies which includes CT, MRI and ultrasound photo are used to hit upon the tumor in a brain. on this approach MRI photos are used to diagnose brain tumor guide type of tumor vs non-tumor is a tough challenge for radiologists. we gift an approach for detection and type of tumors with inside the brain. The computerized brain tumor type could be very hard challenge in brain tumor. In this approach, computerized brain tumor detection is executed with the aid of using the use of Convolutional Neural Networks (CNN) type. Our proposed automation gadget could take an MRI and examine it to locate benign (non-cancerous) or malignant (cancerous).

**key Terms -** CT, MRI, Convolutional Neural Networks.

## I. INTRODUCTION

The area of clinical imaging is gaining significance with an growth with inside the call for automated, reliable, rapid and green analysis that can offer perception to the photo higher than human eyes. Brain tumor is the second one main motive for most cancers-associated deaths in guys in age 20 to 39 and 5<sup>th</sup> main motive most cancers amongst ladies in equal age group. Brain tumors are painful and can bring about numerous illnesses if now no longer cured properly. Diagnosis of tumor is a totally critical element in its remedy. Identification performs an critical element with inside the analysis of benign and malignant tumors. A top purpose in the back of an growth with inside the range of most cancers sufferers internationally is the lack of understanding closer to remedy of a tumor in its early stages. This paper discusses such an set of rules that could tell the consumer approximately information of tumor the use of simple photo processing strategies. These strategies encompass noise elimination and polishing of the photo along side simple morphological features, erosion and dilation, to achieve the history. Subtraction of history and its bad from distinct units of photos consequences in extracted tumor photo. Plotting contour and c-label of the tumor and its boundary presents us with data associated with the tumor that could assist in a higher visualization in diagnosing cases.

This procedure allows in figuring out the length, form and role of the tumor. It allows the clinical body of workers in addition to the affected person to recognize the seriousness of the tumor with the assist of various color-labeling for distinct ranges of elevation. A GUI for the contour of tumor and its boundary can offer data to the clinical body of workers on click on of consumer desire buttons.

## II. LITERATURE SURVEY

In latest years, photo processing has carried out to procedures snap shots in scientific stream, in coordinating mobileular identification. S. Mokhles in 2012 offered some distinguishing evidence advances, inclusive of fragmenting snap shots to extricate the object from the inspiration through the edge. This detail turned into offered with the 'Gabor channel' with the intention to accomplish greater association into malignant increase cells. H. G. Zadeh in 2013 proposed in addition advances, that is image extraction and department of snap shots for diagnosing malignancy cells. The Gaussian smoothing concept turned into offered as a keeping apart purpose, beyond to making use of the 'Quick Fourier Transform' (FFT). AI for tumor discovery: 'NN', 'Fluffy C-signify' calculations turned into offered for the recognizable evidence of tumorous cells. This takes decrease computational time but the precision moreover decrease. X. Chen affords great checking innovation in 2014. Be that because it may, this innovation is becoming only for the complicated improvement of great desire. From the formerly cited strategies and using of advances, on this exam paper we centre across the recognizable evidence of thoughts tumor using image coping with procedures.

## III. EXISTING TECHNIQUES

Existing solution of extraction of brain tumor from CT test photos tumor element is detected from the CT test of the retina. The gadget tell the consumer approximately information of tumor the use of simple photo processing strategies. The strategies encompass noise elimination and polishing of the photo along side simple morphological features, erosion and dilation, to achieve the history. Subtraction of history and its bad from distinct units of photos consequences in extracted tumor photo.

#### IV. PROPOSED TECHNIQUES

The human brain is modeled with the aid of using the use of layout and implementation of neural community. The neural community is specially used for vector quantization, approximation, information clustering, sample matching, optimization features and type strategies. The neural community is split into 3 kinds primarily based totally on their interconnections. Three kind neural networks are comments, feed ahead and recurrent community. The Feed Forward Neural community is in addition divided into unmarried layer community and multilayer community. In the unmarried layer community, the hidden layer isn't offered. But it consists of handiest enter and output layer. However, the multilayer includes enter layer, hidden layer and output layer. The closed loop primarily based totally comments community is known as recurrent community. In the everyday neural community, photo can't scalable. But in convolution neural community, photo can scalable (i.e) it's going to take 3-d enter extent to 3-d output extent (length, width, height). The Convolution Neural Network (CNN) includes enter layer, convolution layer, Rectified Linear Unit (ReLU) layer, pooling layer and absolutely linked layer. In the convolution layer, the given enter photo is separated into numerous small regions. Element smart activation feature is done in ReLU layer. Pooling layer is optional. We can use or skip. However the pooling layer is mainly used for down sampling. In the very last layer (i.e) absolutely linked layer is used to generate the magnificence rating fee primarily based totally at the chance in-among zero to 1.

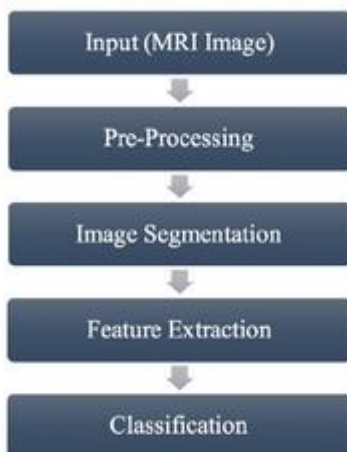


Fig 1. methodology

The block diagram of brain tumor type primarily based totally on convolution neural community is proven in fig.1. The CNN primarily based totally brain tumor type is split into levels which includes schooling and trying out levels. The range of photos is split into distinct class with the aid of using the use of labels which includes tumor and non-tumor brain photo etc. In the schooling phase, preprocessing, function extraction and type with Loss feature is carried out to make a prediction version. Initially, label

the schooling photo set. In the preprocessing photo resizing is carried out to alternate length of the photo. The loss feature is calculated with the aid of using the use of gradient descent set of rules.

The uncooked image pixel is mapping with magnificence ratings with the aid of using the use of a rating feature. The great of unique set of parameters is measured with the aid of using loss feature. It is primarily based totally on how properly the brought on ratings authorized with the floor reality labels with inside the schooling information. The loss feature calculation could be very critical to enhance the accuracy. If the loss feature is high, while the accuracy is low. Similarly, the accuracy is high, while the loss feature is low. The gradient fee is calculated for loss feature to compute gradient descent set of rules. Repeatedly examine the gradient fee to compute the gradient of loss feature.

#### V. RESULTS

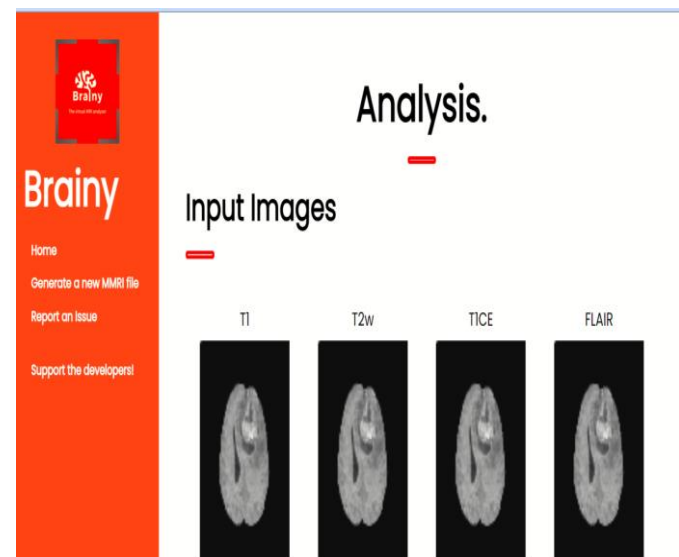


Fig2..Input Images

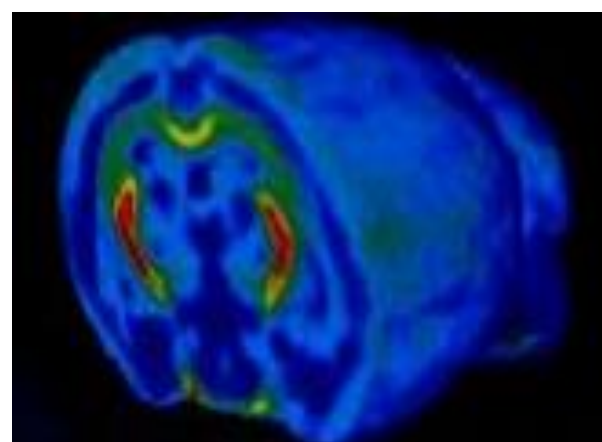


Fig.3. Image of Benign tumor.

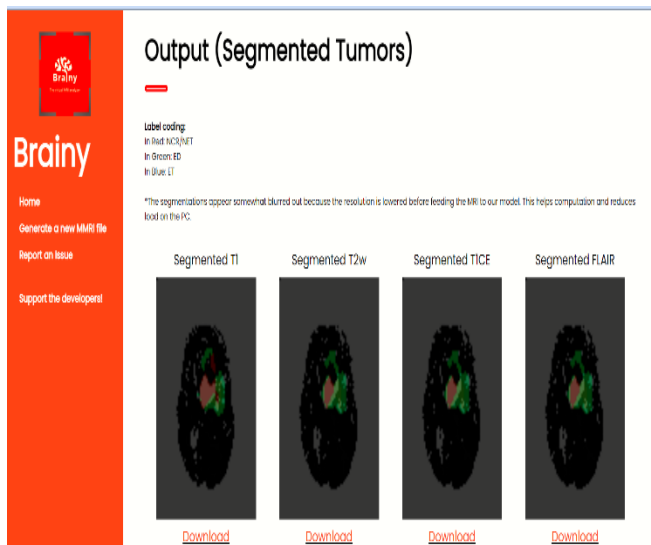


Fig 4. Output MRI Images

## VI. CONCLUSION

In destiny, we plan to make bigger our algorithms to 3-dareawhen you consider that we couldn'tdone the modern overall performance with a 2D community. However, this couldrestrictusing the communitydue to the fact the intensity of the MRI information can alternate. We will evenmake bigger the CRF post-processing with the aid of usingincluding temporal data. Additionally, in a few cases, modern strategies skilled a separate community and proposed a cascaded gadget. Another technique that could enhance the consequences is to pre-teach the community on massive datasets which includes ImageNet. We plan to pre-teach the downsampling a part of the U-conclusion.

## VII. ACKNOWLEDGEMENT

We are grateful to **Mr. J. MAHESH KUMAR**, Assistant Professor(E.C.E),for having allowed carrying out this paper work.we take this opportunity to express my profound and whole heartfelt thanks to our guide, who with his patience support and sincere guidance helped us in the successful completion of the paper.

We would like to thank **Dr. B. Srinivasa Raja, Professor and Head of Department (ECE)**, for valuable suggestions throughout our paper which have helped in giving define shape to this work. We are particularly indebted to him for his innovative ideas, valuable suggestions and guidance during the entire period of work and without his unfathomable energy and enthusiasm, this paper would not have been completed.

We like to express my deep sense of gratitude to **Dr. P.M.M.S. Sarma, Principal of GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY(A)**, for providing us a chance to undergo this paper in a prestigious institute.

## VIII. REFERENCES

1. A. KabirAnaraki, M. Ayati, and F. Kazemi, "Magnetic resonance imaging-based brain tumor

grades classification and grading via convolutional neural networks and genetic algorithms," *Biocybernetics and Biomedical Engineering*, vol. 39, no. 1, pp. 63–74, 2019.View at: [Publisher Site](#) | [Google Scholar](#).

2. J. Ker, L. Wang, J. Rao, and T. Lim, "Deep learning applications in medical image analysis," *IEEE Access*, vol. 6, pp. 9375–9389, 2018.View at: [Publisher Site](#) | [Google Scholar](#).
3. S. Khan and S.-P. Yong, "A deep learning architecture for classifying medical images of anatomy object," in *Proceedings of the 2017 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC)*, pp. 1661–1668, Kuala Lumpur, Malaysia, December 2017.View at: [Google Scholar](#).
4. M. W. Nadeem, M. A. Al Ghamdi, M. Hussain et al., "Brain tumor analysis empowered with deep learning: a review, taxonomy, and future challenges," *Brain Sciences*, vol. 10, no. 2, pp. 1–33, 2020.View at: [Publisher Site](#) | [Google Scholar](#).
5. "Health in the European Union–facts and figures–Statistics Explained," 2019, [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Health\\_in\\_the\\_European\\_Union\\_-\\_facts\\_and\\_figures](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Health_in_the_European_Union_-_facts_and_figures).
6. Bureau of Labor Statistics, "Radiologic and MRI Technologists: Occupational Outlook Handbook:: U.S. Bureau of Labor Statistics," United States Department of Labor, 2018, <https://www.bls.gov/ooh/healthcare/radiologic-technologists.htm>.
7. A. Işin, C. Direkoğlu, and M. Şah, "Review of MRI-based brain tumor image segmentation using deep learning methods," *Procedia Computer Science*, vol. 102, pp. 317–324, 2016.View at: [Publisher Site](#) | [Google Scholar](#).
8. P. Mlynarski, H. Delingette, A. Criminisi, and N. Ayache, "Deep learning with mixed supervision for brain tumor segmentation," *Journal of Medical Imaging*, vol. 6, no. 3, p. 1, 2019.View at: [Publisher Site](#) | [Google Scholar](#).
9. C. G. Madamombe, "Deep learning techniques to classify and analyze medical imaging data," *International Journal of Computational Science and Engineering*, vol. 7, no. 4, pp. 109–113, 2018.View at: [Google Scholar](#).
10. M. Soltaninejad, G. Yang, T. Lambrou et al., "Supervised learning based multimodal MRI brain tumour segmentation using texture features from supervoxels," *Computer Methods and Programs in Biomedicine*, vol. 157, pp. 69–84, 2018.View at: [Publisher Site](#) | [Google Scholar](#).
11. H. Dong, G. Yang, F. Liu, Y. Mo, and Y. Guo, "Automatic brain tumor detection and segmentation using U-net based fully convolutional networks," *Communications in Computer and*



- Information Science*, vol. 1, pp. 506–517, 2017. View at: [Publisher Site](#) | [Google Scholar](#).
12. M. Soltaninejad, G. Yang, T. Lambrou et al., “Automated brain tumour detection and segmentation using superpixel-based extremely randomized trees in flair MRI,” *International Journal of Computer Assisted Radiology and Surgery*, vol. 12, no. 2, pp. 183–203, 2017. View at: [Publisher Site](#) | [Google Scholar](#).
  13. J. Cheng, “Brain Tumor Dataset”, figshare. Dataset, 2017, <https://doi.org/10.6084/m9.figshare.1512427.v5>.
  14. J. Cheng, W. Huang, S. Cao et al., “Enhanced performance of brain tumor classification via tumor region augmentation and partition,” *PLoS One*, vol. 10, no. 10, Article ID e0140381, 2015. View at: [Publisher Site](#) | [Google Scholar](#).
  15. Z. N. K. Swati, Q. Zhao, M. Kabir et al., “Content-based brain tumor retrieval for MR images using transfer learning,” *IEEE Access*, vol. 7, pp. 17809–17822, 2019. View at: [Publisher Site](#) | [Google Scholar](#).
  16. M. M. Badža and M. C. Barjaktarović, “Classification of brain tumors from mri images using a convolutional neural network,” *Applied Sciences*, vol. 10, no. 6, 2020. View at: [Publisher Site](#) | [Google Scholar](#).
  17. N. Noreen, S. Palaniappan, A. Qayyum, I. Ahmad, M. Imran, and M. Shoaib, “A deep learning model based on concatenation approach for the diagnosis of brain tumor,” *IEEE Access*, vol. 8, pp. 55135–55144, 2020. View at: [Publisher Site](#) | [Google Scholar](#).
  18. S. Tripathi, A. Verma, and N. Sharma, “Automatic segmentation of brain tumour in MR images using an enhanced deep learning approach,” *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, pp. 1–10, 2020. View at: [Publisher Site](#) | [Google Scholar](#).
  19. A. M. Alqudah, H. Alquraan, I. A. Qasmieh, A. Alqudah, and W. Al-Sharu, “Brain tumor classification using deep learning technique - a comparison between cropped, uncropped, and segmented lesion images with different sizes,” *International Journal of Advanced Trends in Computer Science and Engineering*, vol. 8, no. 6, pp. 3684–3691, 2019. View at: [Publisher Site](#) | [Google Scholar](#).
  20. X. Chen, M. Zeng, Y. Tong et al., “Automatic prediction of MGMT status in glioblastoma via deep learning-based MR image analysis,” vol. 2020, Article ID 9258649, nine pages, 2020. View at: [Publisher Site](#) | [Google Scholar](#).

# IJEAST

INTERNATIONAL JOURNAL  
OF ENGINEERING APPLIED SCIENCE  
AND TECHNOLOGY

## ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

## FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies



### PEER REVIEWED

All submissions are rigorously peer reviewed to ensure quality.



### OPEN ACCESS

Free and unrestricted access to research for all.



### GLOBAL REACH

Connecting researchers and professionals worldwide.



### TIMELY PUBLICATION

We ensure a swift and efficient publication process.



For more information, visit our website

[www.ijeast.com](http://www.ijeast.com)



INTERNATIONAL JOURNAL  
OF ENGINEERING APPLIED SCIENCE  
AND TECHNOLOGY

✉ [editor@ijeast.com](mailto:editor@ijeast.com)

🌐 [www.ijeast.com](http://www.ijeast.com)

📍 India



2455-2143