RESEARCH ARTICLE OPEN ACCESS

Brain Tumor Detection by Using Deep Learning Algorithm

Mrs J Sarada MCA, M.Tech, M.Phil, (Ph.D) [1], Arambakam Balaji [2]
[1]Associate Professor, Department of Computer Applications
[2] Student, Department of Computer Applications
[1],[2] Chadalawada Ramanamma Engineering College (Autonomous)

ABSTRACT

Brain diagnosis process is a significant clinical action; it tends to be diagnosis through numerous procedures. The various diagnosis processes are accessible for Brain examining, for example, CT, MRI, X-beam and CTA. In the event that Medical applications are quick and genuine, diagnosis process is simple; these can help the patient's life. Objective: In this work CT examine based brain diagnosis framework is proposed through CNN-GB strategy. A genuine and exact brain diagnosis process gives the better treatment with productive achievement rate. Strategy: In this work the brain anomalies have been recognized through machine and profound learning systems. This work requires dataset (Kaggle dataset) and continuous CT filter pictures. CNN and GBML procedures are applied on CT brain pictures for distinguish the problems. Results: This proposed technique accomplishes 0.992 exactness and 0.993 Tp these are acceptable outcomes contrasted with before strategy. Determination: In this examination a CT filter based brain diagnosis application is planned. This design is a mix of versatile middle channel, CNN profound learning model and inclination boosting AI. Because of mix of three calculations getting the exact outcomes contrasted with before models. This application is accomplishing PSNR = 56.20, SSIM is 0.99, exactness is 0.992, mistake rate is 0.05 normal time 0.07 have accomplished. In addition, this strategy is checked on different high thickness of commotion, at all sort of densities carried out application accomplishes the greater improvement.

Keywords: **-** Brain diagnosis process is a significant clinical action; it tends to be diagnosis through numerous procedures.

I. INTRODUCTION

Clinical centers offer numerous alternatives to help patients in discovery of medical issues. Late advances in PC research acquired numerous novel thoughts the field of robotized clinical emotionally supportive networks. We can see that facilities are furnished with new gadgets. New magnifying lens are utilized to notice tissues and organs. Mixed media frameworks help in assessments. Consequences of screenings and sweeps are assessed on screens which give great show supportive in definite assessments.

One of the new fields where software engineering is much useful is radiography or all the more correctly different types of RTG and CT screening frameworks. Among these, brain and lung issues are vital illnesses in which quicker identification may productively profit with Computational Intelligence models. In [16] was introduced how useful in vigorous assessment can be a diagnosis dependent on these techniques for treatment of lung and brain metastases, while [10] talked about significance of neuroimaging in brain injury assessment and Sheng et al. [36] proposed a framework for retina diagnosis. PC strategies applied in clinical imaging have two primary headings lately. One is division of organs from pictures which helps medicians to focus on indications, where convolutional neural organizations are among the best proficient constructions [46]. The second is mechanized analyze which offers medicians an extra guidance regarding indications to counsel. CT sweeps of head organs are utilized in different assessments. Along these lines we can discover many dedicated PC techniques created in such fields. In [39] was examined how to separate midsagittal plane from CT sweeps of head for facial medical procedure. Different picture fulfillment techniques can be utilized to further develop CT enlistment as introduced in Zheng et al. [48]. Another significant perspective is to remove tissues which need definite assessment. In this undertaking additionally PC frameworks can productively help medicians. In [1] was proposed another and quick brain extraction from CT checks, while subordinate of drain PC division of CT examines was proposed in Ray et al. [30].

Complex neural models are prepared to fill in as exact counselors in IoT for clinical purposes and savvy conditions. There are many fascinating study

papers examining propels. In [8, 38] was examined enormous information investigation approach dependent on AI. Difficulties for the improvement of new models were characterized in Lv et al. [23], quite possibly the main perspective was further developed learning model for complex neural structures. For medical care and vision frameworks, as significant perspective for the turn of events, was likewise characterized improvement in their development for picture processing

II. RELATED WORKS

Ongoing years brought additional opportunities for Artificial Intelligence. New PC designs are making it conceivable to carry out complex constructions which figure out how to identify, extricate and perceive clinical side effects of hazardous infections. In [19] was introduced a thresholding approach used to prepare convolutional neural organization (CNN) for brain hemorrhages location from CT filters. Profound adapting additionally fills in as indicator in clinical assessments of infarct brain volume [32] and online stroke location [12]. Profound learning is additionally utilized in vision help [18] and picture watermarking [22]. In addition, it was additionally displayed in Mostapha and Styner [24] that profound learning procedures may affect clinical assessments of people in different age, likewise in a newborn child time. Bhandary et al. [2] introduced a profound learning structure for CT-based identification.

Among utilizations of profound learning in clinical frameworks vital are lung check assessment and brain issues recognition. Intriguing examinations introducing inventories of late methodologies were Hu et al. [17] for disease location and Chilamkurthy et al. [7] for problems of head organs. Profound learning strategies are regularly utilized in recognition of breakdowns in these two pieces of human bodies. Lakshmanaprabu et al. [20] talked about a sythesis of profound learning model for ideal discovery of cellular breakdown in the lungs, while in Capizzi et al. [3] we have introduced our way to deal with effective identification of lung knobs dependent on combination of fluffy guidelines and probabilistic neural organization (PNN). Use of Artificial Intelligence to brain checks is at times more troublesome since brain CT filter gives considerably more data. Accordingly, applied techniques are more mind boggling, and the process to extricate tissues and to discover side effects of brain problems is requesting. Profound learning can be utilized for grouping of different brain problems from CT examines as demonstrated in Gao et al. [13]. Cherukuri et al. [6] talked about how to make division sourced in learning calculation to distinguish hydrocephalic breakdowns. In Özyurt et al. [8], profound learning dependent on convolutional neural organization was joined with fluffy entropy capacity to animate brain tumor identification. In Deepak and Ameer [9], the possibility of profound taking in for brain tumors discovery from CT checks was joined with move learning, and that assisted with shortening the preparation time. In Zeng and Tian [4] was proposed a productive procedure to speed up constructions of convolutional neural organizations by diminishing immaterial between spatial and between piece relations, which assisted with accelerating the process of acknowledgment. Various suggestions of speed increase were created for fragmented information or unique kinds of pictures. In Liu et al. [21] was introduced a speed increase method for pictures without comparable naming from clinical assessments, while in Nie et al. [7] a model for newborn child brain imaging was introduced. A further developed CNN was utilized for isotense division. Profound learning models are likewise produced for IoT interfaces as introduced in Xu et al. [4] and Dourado et al. [11], where patients with specific indications were dissected. A wide study on different executions of brain tumors identification was introduced in Sarmento et al. [3] and Muhammad et al. [5] for savvy clinical medical care units.

III. EXISTING APPROACH

The CT scan-based brain tumor detection system gives the better diagnosis process [1]. For any medical image processing techniques follows the three categories of operation those are pre-processing feature extraction and classification. Preprocessing stage is offering segmentation, transformation, and filtration. In this research work

adaptive median filtration is taken as pre-processor. Deep learning classifier combined with a discrete wavelet transform (DWT) and principal components analysis (PCA) to classify a dataset with three different brain tumors. In many BTS applications, the brain tumor image segmentation is achieved by classifying pixels.

IV. PROPOSED SYSTEM

The recent technologies giving the hidden information about selected medical image. Image pattern recognition and human interaction are the computer applications in image recognition mechanism. These types of tools are developing the data acquisition from x-ray, MRI, CT and various medical imaging techniques [13-15]. The diagnosis center lab technicians and researchers are using this application they can diagnosis the process simple. This type of scanning mechanisms, imaging the disorders of brain, it can increase the sensitivity and accuracy via disease diagnosis [16-18]. We perform a thorough performance evaluation of the proposed system and compare it with the state-of-the-art systems employing logistic regression (LR). The comparison shows the proposed system outperforms LR in terms of the classification accuracy, recall, precision, and area under the receiver operation curve (AUROC).

MRI and CT-scan images are important way to diagnose disease of human being efficiently. The manual analysis of tumor based on visual inspection by radiologist/physician is the conventional method, which may lead to wrong classification when a large number of MRIs are to be analyzed. To avoid the human error, an automated intelligent classification system is proposed which caters the need for classification of image. One of the major causes of death among people is Brain tumor. The chances of survival can be increased if the tumor is detected correctly at its early stage. Magnetic resonance imaging (MRI) technique is used for the study of the human brain. In this research work, classification techniques based on VGG16 & MOBILENET are proposed and applied to brain image classification. In this paper feature extraction from MRI Images will be carried out by gray scale, symmetrical and texture features. The main objective of this paper is to give an excellent outcome (i.e. higher accuracy rate andlower error rate) of MRI brain cancer classification using VGG16 & MOBILENET.

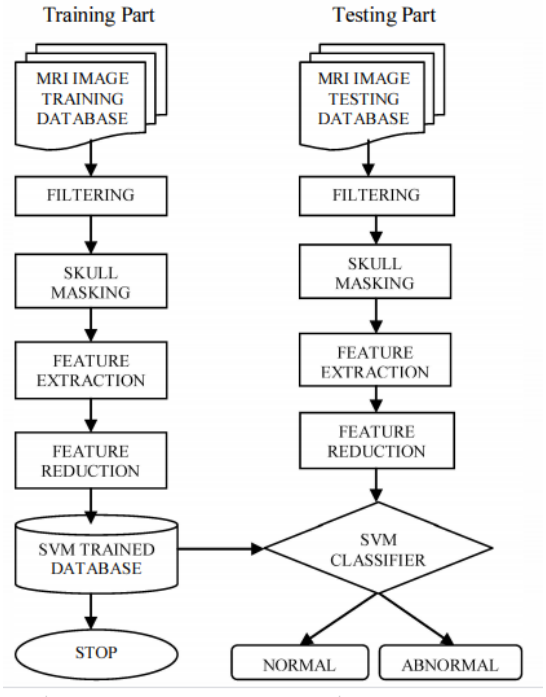

Fig 1 Architecture

In proposed work, While challenging, early diagnosis of individuals at high risk of futurebrain tumour is very critical in order to delay or prevent the disease progression. Since most brain tumour typically have an onset in adolescence or early adulthood. early detection could delay, or even prevent, future onset of these severe illnesses in high-risk adolescents. Predictive modeling based approaches offer promising tools to be used for clinical diagnosis, such as identification of neuroimaging-based biomarker that can support early identification of potentially at-risk individuals of developing mental disorders, with the potential risk being unidentified. Deep learning algorithm using neuroimaging data could help differentiate healthy adolescents genetically at-risk for brain tumour. The proposed CNN and VGG16 method will give better accuracy.

Advantages

- Complexity is less compared to previous process
- Good accuracy
- More features are not extracted which will reduce the efficiency
- Resizing is done, which will increase the outcomes.
- With its simplicity and fast processing time, the proposed algorithm gives better execution time.

Algorithms:
CNN

In the past few decades, Deep Learning has proved to be a very powerful tool because of its ability to handle large amounts of data. The interest to use hidden layers has surpassed traditional techniques, especially in pattern recognition. One of the most popular deep neural networks is Convolutional Neural Networks.

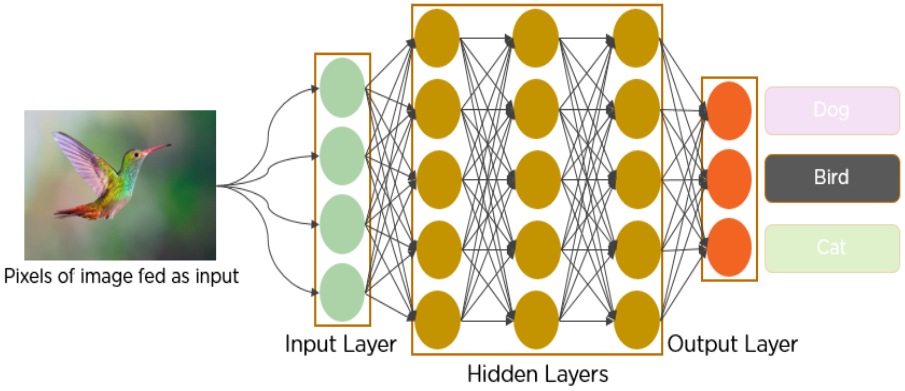

Fig 2 CNN

Since the 1950s, the early days of AI, researchers have struggled to make a system that can understand visual data. In the following years, this field came to be known as Computer Vision. In 2012, computer vision took a quantum leap when a group of researchers from the University of Toronto developed an AI model that surpassed the best image recognition algorithms and that too by a large margin.

The AI system, which became known as AlexNet (named after its main creator, Alex Krizhevsky), won the 2012 ImageNet computer vision contest with an amazing 85 percent accuracy. The runner-up scored a modest 74 percent on the test.

At the heart of AlexNet was Convolutional Neural Networks a special type of neural network that roughly imitates human vision. Over the years CNNs have become a very important part of many Computer Vision applications and hence a part of any computer vision cours. So let's take a look at the workings of CNNs.

Background of CNNs

CNN's were first developed and used around the 1980s. The most that a CNN could do at that time was recognize handwritten digits. It was mostly used in the postal sectors to read zip codes, pin codes, etc. The important thing to remember about any deep learning model is that it requires a large amount of data to train and also requires a lot of

computing resources. This was a major drawback for CNNs at that period and hence CNNs were only limited to the postal sectors and it failed to enter the world of machine learning.

RESULTS

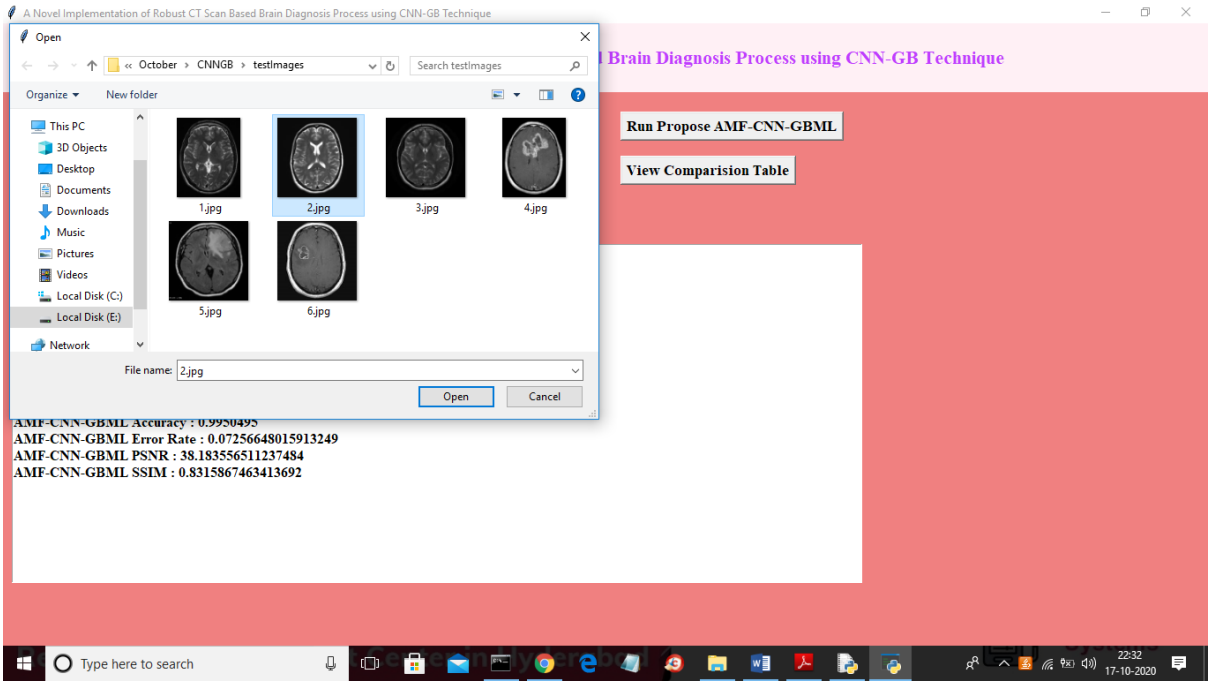

Fig 3: uploading file and then click on "open" button to get below prediction result

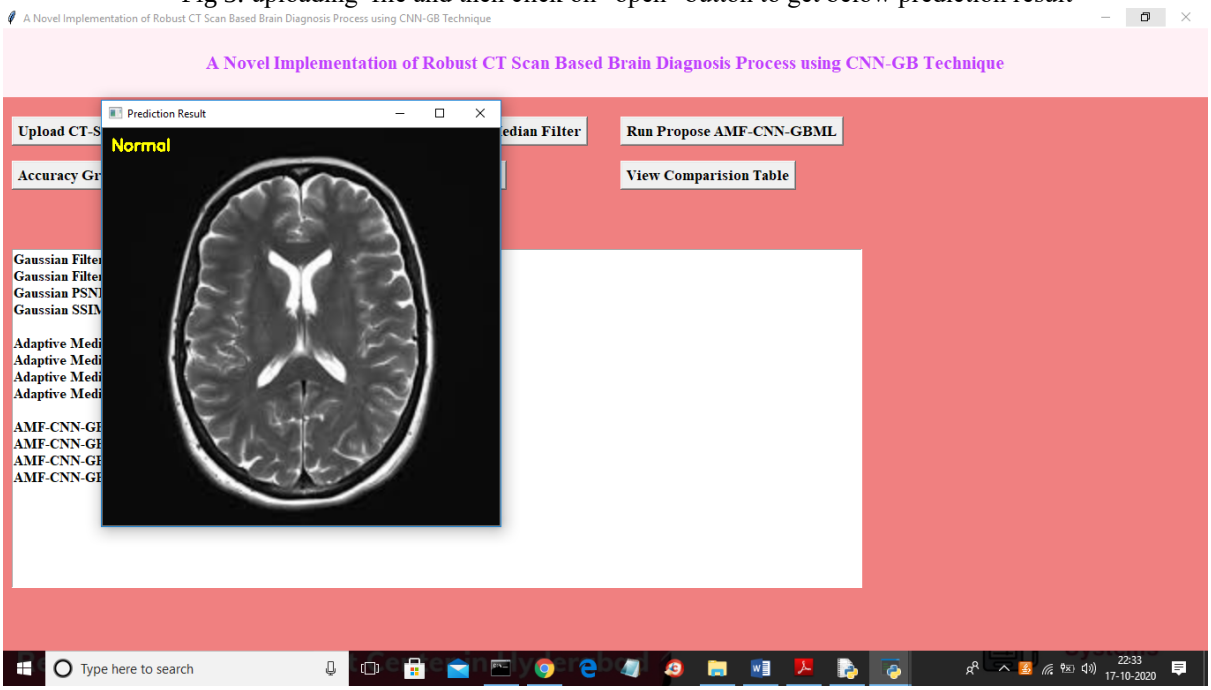

Fig 4: Upload other image and test

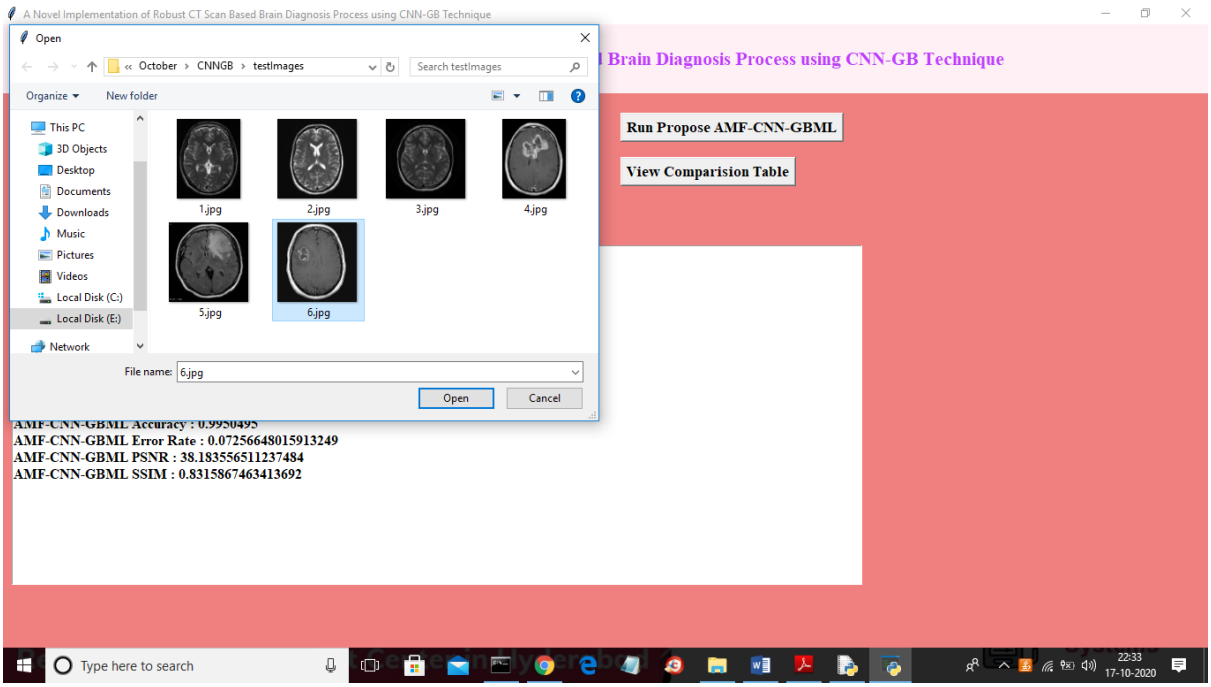

Fig 5: Prediction result

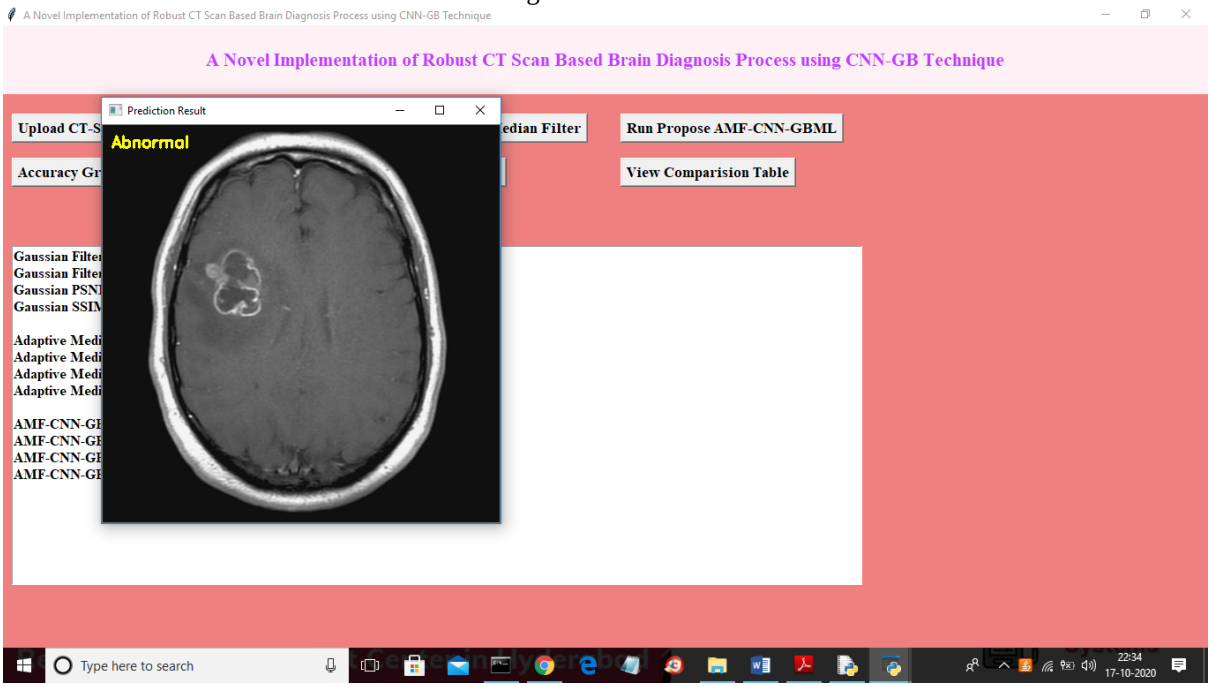

Fig 6: Predicted as ABNORMAL

V. CONCLUSION

In this investigation a CT scan-based brain diagnosis application is designed. This architecture is a combination of adaptive median filter, CNN deep learning model and gradient boosting machine learning. Due to combination of three algorithms getting the accurate results compared to earlier models. This application is achieving PSNR = 56.20, SSIM is 0.99, accuracy is 0.992, error rate is 0.05 average time 0.07 have achieved. Moreover, this

method is verified on various high density of noise, at all type of densities

implemented application attains the more improvement. Therefore, it is concluded that the designed AMF, CNN and GBML based CT brain diagnosis system giving the outperform results and this method is compete with present technology. At final demonstrate that designed application is more useful for hospitals, diagnosis centers and research work.

REFERENCES

[1] Bengio, Y., Lamblin, P., Popovici, D., Larochelle, H.: Greedy layer-wise training of deep networks. Advances in Neural Information Processing Systems 19 (NIPS), 153–160 (2007).

[2] Bengio, Y.: Learning deep architectures for AI. Foundations and Trends in Machine Learning 2, 1–127 (2009).

[3] S.-H. Hsu, Q. Peng, and W. A. Tomé, ``on the generation of synthetic CT for an MRI-only radiation therapy workflow for the abdomen," J. Phys., Conf. Ser, vol. 1154, no. 1, Mar. 2019, Art. no. 012011.

[4] Y. Liu, Y. Lei, Y. Wang, T. Wang, L. Ren, L. Lin, M. McDonald, W. J. Curran, T. Liu, J. Zhou, and X.Yang, ``MRI-based treatment planning for proton radiotherapy: Dosimetric validation of a deep learning-based liver synthetic CT generation method," Phys. Med. Biol., vol. 64, no. 14, Jul. 2019, Art. no. 145015.

[5] R. S. Jeena and S. Kumar, "A comparative analysis of MRI and CT brain images for stroke diagnosis," 2013 Annual International Conference on Emerging Research Areas and 2013 International Conference on Microelectronics, Communications and Renewable Energy, Kanjirapally, 2013, pp. 1- 5, doi: 10.1109/AICERA-ICMiCR.2013.6575935.

[6] Y. Lei, J. Harms, T. Wang, S. Tian, J. Zhou, H.-K. Shu, J. Zhong, H. Mao, W. J. Curran, T. Liu, and X. Yang, ``MRI-based synthetic CT generation using semantic random forest with iterative refinement," Phys. Med. Biol., vol. 64, no. 8, Apr. 2019, Art. no. 085001.

[7] S. Kazemifar, S. McGuire, R. Timmerman, Z.Wardak, D. Nguyen,Y. Park, S. Jiang, and A. Owrangi, ``MRI-only brain radiotherapy: Assessing the dosimetric accuracy of synthetic CT images generated using a deep learning approach," Radiotherapy Oncol., vol. 136, pp. 56-63, Jul. 2019.

[8] W. Schneider, T. Bortfeld, and W. Schlegel, ``Correlation between CT numbers and tissue parameters needed for Monte Carlo simulations of clinical dose distributions," Phys. Med. Biol., vol. 5, no. 2, pp. 459478, Feb. 2000.

[9] P. Qian, Y. Jiang, Z. Deng, L. Hu, S. Sun, S. Wang, and R. F. Muzic, Jr., ``Cluster prototypes and fuzzy memberships jointly leveraged crossdomain maximum entropy clustering," IEEE Trans. Cybern., vol. 46, no. 1, pp. 181-193, Jan. 2016.