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| Serial | Title | Citations | Dataset | Technique | Description | Result |
| 1. | Deep Learning Techniques for Medical Image Segmentation: Achievements and Challenges | Hesamian, M. H., Jia, W., He, X., & Kennedy, P. (2019). Deep learning techniques for medical image segmentation: achievements and challenges. *Journal of digital imaging*, *32*(4), 582-596. | Partial Adaptation is taken because of full adaptation is overfitting. | Convolutional Neural Networks | This article consists of three main sections, approaches , training techniques, and challenges. The Network Structure section introduces the major, popular network structures used for image segmentation. It is designed to cover the emerging sequence of the structures. The Challenges section addresses various types of challenges correlated with medical image segmentation using deep learning techniques. These challenges are mainly related to the design of a network, data, and training | The accuracy is about 90% |
| 2. | Brain Tumor Segmentation Using a Fully Convolutional Neural Network with Conditional Random Fields | Zhao, X., Wu, Y., Song, G., Li, Z., Fan, Y., & Zhang, Y. (2016, October). Brain tumor segmentation using a fully convolutional neural network with conditional random fields. In *International workshop on brainlesion: glioma, multiple sclerosis, stroke and traumatic brain injuries* (pp. 75-87). Springer, Cham. | three metrics of Dice, Positive Predictive Value (PPV), and Sensitivity are used to evaluate a method | Fully Convolutional Neural and Network (FCNN) and Conditional Random Fields (CRF) | They Proposed Three steps for their project which is pre-processing, segmentation using the proposed deep network model, and post processing. The absolute intensity values in different MR images or even in the same MR image do not have fixed tissue meanings. It is necessary to pre-process MR images in an appropriate way | The accuracy is about 98% |
| 3. | Interactive Medical Image Segmentation using Deep Learning with Image-specific Fine-tuning | Wang, G., Li, W., Zuluaga, M. A., Pratt, R., Patel, P. A., Aertsen, M., ... & Vercauteren , T. (2018). Interactive medical image segmentation using deep learning with image-specific fine tuning. *IEEE transactions on medical imaging*, *37*(7), 1562-1573. | Model Adaptation | Convolutional Neural Networks,) image specific fine-tuning with the proposed weighted loss function significantly improves segmentation accuracy, | The first challenge of using CNNs for interactive segmentation is that current CNNs do not generalize well to previously unseen object classes that are not present in the training set. As a result, they require labeled instances of each object class to be present in the training set. Second, interactive segmentation often requires image specific learning to deal with large context variations among different images, but current CNNs are not adaptive to different test images, as parameters of the model are learned from training images and then fixed in the testing stage, without image-specific adaptation |  |
| 4. | Deep learning for medical image segmentation using multi-modality fusion | Zhou, T., Ruan, S., & Canu, S. (2019). A review: Deep learning for medical image segmentation using multi-modality fusion. *Array*, *3*, 100004. |  | deep learning and multi-modal medical image segmentation. | The method deep learning has been applied. The network can extract the complex hierarchy features from a large amount of data by using these layers. Multi model image segmentation used to location of target tissue, the variable size, shape. The fusion strategy takes an important role in order to achieve an accurate segmentation result. | The Accuracy is about 90% |
| 5. | Embracing imperfect datasets: A review of deep learning solutions for medical image segmentation | Tajbakhsh, N., Jeyaseelan, L., Li, Q., Chiang, J. N., Wu, Z., & Ding, X. (2020). Embracing imperfect datasets: A review of deep learning solutions for medical image segmentation. *Medical Image Analysis*, *63*, 101693. | Labelled and Unlabelled Datasets | deep learning | They have a perfectly-sized and carefully labelled dataset to train an image segmentation model, particularly for medical imaging applications, where both data and annotations are expensive to acquire. The Datasets used is labelled and unlabelled to classify the pulmonary nodules , deep learning architecture. |  |
| 6. | Scarce annotation is a common problem when using supervised deep learning methods for medical image segmentation | Tajbakhsh, N., Jeyaseelan, L., Li, Q., Chiang, J. N., Wu, Z., & Ding, X. (2020). Embracing imperfect datasets: A review of deep learning solutions for medical image segmentation. *Medical Image Analysis*, *63*, 101693. |  | Convolutional Neural Networks(CNN) and Fully Convolutional Neural and Network (FCNN) | Advanced Computer visions are due to application of Convolutional Neural Networks (CNN) on graphics processing units . one down sided of CNNs is that spatial information of the image. Conventional features are fed into final fully connected layers of the network. It shows the 3D FCNs can be efficient trained on modern GPUs. | The Accuracy is about 90% |
| 7. | Brain Tumor Segmentation using Cascaded Deep Convolutional Neural Network | Hussain, S., Anwar, S. M., & Majid, M. (2017, July). Brain tumor segmentation using cascaded deep convolutional neural network. In *2017 39th annual International Conference of the IEEE engineering in medicine and biology Society (EMBC)* (pp. 1998-2001). IEEE. | BRATS dataset T1, T1c, T2 and  Flair | Deep Convolutional Neural Networks (DCNN) | The proposed methodology is applied on multimodal MRI sequences and exploits the inherent pattern recognition capability of CNN to classify tumor pixels. The input for second half of the network is extracted from the center of the input of first half. The concatenated input is fed into the second part of the network and the output layer i.e. softmax activation predicts class probabilities, which are accounted for in the loss function. | The Accuracy is about 70% |
| 8. | Deep Learning for Multi-task Medical Image Segmentation in Multiple Modalities | Moeskops, P., Wolterink, J. M., van der Velden, B. H., Gilhuijs, K. G., Leiner, T., Viergever, M. A., & Išgum, I. (2016, October). Deep learning for multi-task medical image segmentation in multiple modalities. In *International Conference on Medical Image Computing and Computer-Assisted Intervention* (pp. 478-486). Springer, Cham. | Brain MRI | Deep learning and Convolutional neural networks · | The feasibility of using a single CNN architecture for different medical image segmentation tasks in different imaging modalities visualising different anatomical structures. The feasibility of using a single trained instance of this CNN architecture for different segmentation tasks. The data for brain MRI, breast MRI and cardiac CTA were split into 14/20, 14/20 and 6/4 training/test images | The Accuracy is about 90% |
| 9. | Deep Learning in Medical Image Analysis | Shen, D., Wu, G., & Suk, H. I. (2017). Deep learning in medical image analysis. *Annual review of biomedical engineering*, *19*, 221-248. | Medical image analysis | Deep Learning | An auto-encoder or auto-associator (69) is a special type of two layer neural network that learns a latent or compressed representation of the input by minimizing the reconstruction error between the input and output values of the network, namely the reconstruction of the input from the learned representations. They created a hierarchical learning framework with a multiscale CNN to capture various sizes of lung nodules. In this CNN architecture, three CNNs that took nodule patches from different scales as input were assembled in parallel | The Accuracy is about 95% |
| 10. | Variability and reproducibility in deep learning for medical image segmentation | Renard, F., Guedria, S., Palma, N. D., & Vuillerme, N. (2020). Variability and reproducibility in deep learning for medical image segmentation. *Scientific Reports*, *10*(1), 1-16. | Data augmentation and cross validation | Deep Learning and Machine Learning | One of the main sources of variability in machine learning originates from the difference between the observed samples of the dataset and the real distribution of the dataset. The fact that the learning step of the algorithm is performed on only a part of the distribution can affect the reproducibility and particularly the replication of the results. The input data distribution on the one hand, and the variability in the optimization stochastic process on the other hand: these cannot be addressed in the same way, which in turn leads to different mathematical tools being needed to evaluate this variability | The Accuracy is about 90% |
| 11. | Brain Tumor Segmentation with Deep Learning | Rao, V., Sarabi, M. S., & Jaiswal, A. (2015). Brain tumor segmentation with deep learning. *MICCAI Multimodal Brain Tumor Segmentation Challenge (BraTS)*, *59*. | BRATS dataset T1, T1c, T2 and  Flair | Deep Learning | They are finding tumors in brain images is to perform pixel-wise classification. Each of the CNNs follows the architecture as in Fig 2. Raw pixels from patches around each pixel form the input to the network. The softmax layer classifies the pixel as one of the five classes. All the preliminary results were run on workstations with 16GB of RAM and a CUDA compatible Nvidia GPU. | The Accuracy is about 67% |
| 12. | Review of MRI-based brain tumor image segmentation using deep learning methods | Işın, A., Direkoğlu, C., & Şah, M. (2016). Review of MRI-based brain tumor image segmentation using deep learning methods. *Procedia Computer Science*, *102*, 317-324. | BRATS dataset T1, T1c, T2 and  Flair | Deep Learning | Semi-automatic methods require interaction of the user for three main purposes; initialization, intervention or feedback response and evaluation. the brain tumor segmentation performance of using deeper CNN architectures. | The Accuracy is about 83% |
| 13. | Brain tumor segmentation with deep learning technique | Madhupriya, G., Guru, N. M., Praveen, S., & Nivetha, B. (2019, April). Brain tumor segmentation with deep learning technique. In *2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI)* (pp. 758-763). IEEE. | BRATS dataset T1, T1c, T2 and  Flair | CNN and PNN architectures | convolutional neural network architecture is used to design the proposed architecture called cascaded structures. The main part used to build a CNN is a convolutional layer and pooling layer. Several layers can be inserted as a hidden layer to extract the individual features. While kernels of various size cascade over a tumor region, our model reads feature of an image and detects the tumor region. Once the tumor identified successfully, all the other parts of brain image is set to black | The Accuracy is about 50% |
| 14. | Brain Tumour Image Segmentation Using Deep Networks | Ali, M., Gilani, S. O., Waris, A., Zafar, K., & Jamil, M. (2020). Brain Tumour Image Segmentation Using Deep Networks. *IEEE Access*, *8*, 153589-153598. | BRATS dataset T1, T1c, T2 and  Flair | Deep Learning | Deep learning algorithms outperform on tasks of semantic segmentation as opposed to the more conventional, context based computer vision approaches. The method performs favourably on the whole tumour and tumour core classes, the segmentation accuracy of the enhancing tumour needs improvement. | The Accuracy is about 75% |
| 15. | An Enhancement of Deep Learning Algorithm for Brain Tumor Segmentation Using Kernel Based CNN with M-SVM | Thillaikkarasi, R., & Saravanan, S. (2019). An enhancement of deep learning algorithm for brain tumor segmentation using kernel based CNN with M-SVM. *Journal of medical systems*, *43*(4), 1-7. | BRATS dataset T1, T1c, T2 and  Flair | Deep learning algorithm Kernel based CNN and M-SVM | The image segmentation can be the essential complexity in tumor detection in brain MRI image. But the tumor segmentation of separation process is very important to identify the brain tumor and efficient diagnosis. The automated algorithm kernel based CNN with M-SVM is introduced to effective brain tumor segmentation with low time complexity, low error rate and high accuracy. The time for segmentation of brain tumor has been executed in milliseconds. | The Accuracy is about 80% |