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A Survey on Brain Tumor Detection using Different Techniques

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Abstract - *Brain Tumor detection is one among the foremost crucial and arduous tasks within the tract of medical image process as a human-assisted manual classification may result in inaccurate prediction and identification. Moreover, it's an intensifying task once there's an outsized quantity of information present to be assisted. Brain neoplasms have high diversity in appearance and there's a similarity between neoplasm and normal tissues and so the extraction of tumor regions from pictures becomes unyielding. The tumor detection may be done exploiting varied strategies and technologies.*

Key Words: Brain Tumor, Deep Learning, RNN, Support Vector Machine (SVM), Deep learning (DL), Convolution Neural Network (CNN), Deep Belief Network (DBF), Gray Scale Co-occurrence Matrix (GLCM), Magnetic Resonance Imaging (MRI), Principle Component Analysis (PCA).

1. INTRODUCTION

Brain tumor is the unwanted growth of abnormal cells in brain in a disorder way. The symptoms of brain tumor are its size, shape and location. To diagnose the brain tumor many methodologies can be used like MRI scan, BIOPSY, SPECT (Single Photon Emission Computed Tomography) scan. Brain tumors are of two types either it is Benign or it is Malignant Tumor. Benign tumors are non-cancerous cells while malignant tumors are cancerous cells.

The tumor is one in all the deadliest diseases currently a day. Early detection of the tumour will be facilitate to enhance the medical infrastructure and also the treatment in addition. Generally, the late detection of illness will cause poor treatment convenience to the patient. The various technologies will be applied within the field can improve within the reduction of manual errors that are potential to occur. The traditional way of detecting illness manually may cause error in detection and identification. So, latest technologies can be reduce such error to an extent.

Machine Learning, Deep Learning, Artificial Intelligent and their subsets are such kind of technologies that can help in this field for the automated detection of brain tumor. Algorithms are available to solve all such problems in these areas. These algorithms can further improve for more efficiency or new problem solving. The data-set are images with positive and negative cases. The main features can be all the pixel values including color, hue, saturation, brightness, sharpness, entropy, grey scale etc. The survey on brain tumor detection will help to know which techniques and algorithms are mainly available in various technologies, more accurate and future methods to be implemented.

2. LITERATURE SURVEY

T. Hossain [1] proposed a system that distinguish between normal and abnormal pixels, supported texture based and statistical based options. Fuzzy C-Means clustering is employed for tumour segmentation which might predict tumour cells accurately. The segmentation method was followed by classification using ancient classifiers and Convolutional Neural Network. within the ancient classifier part, different ancient classifiers like K-Nearest Neighbor, logistic Regression, Multilayer Perceptron, Naïve Bayes, Random Forest, and Support Vector Machine are applied and compared the results. Among these ancient ones, SVM gave us the very best accuracy of 92.42%. Further, for higher results, CNN is enforced that brought within the accuracy 97.87% with a split ratio of 80:20 of 217 images.

G. Hemanth [2] proposed an automatic segmentation technique that depends upon CNN (Convolution Neural Networks). Various levels are concerned within the method. The data is collected and every one the preprocessing steps are done. CNN is enforced for image segmentation. LinkNet is employed for semantic segmentation. It involves two basic strategies of convolution and pooling. Convolution and pooling layers are organized until high level of classification accuracy is achieved. The CNN provided the most effective accuracy among the opposite ancient strategies for detection.

Y. Zhou dynasty [3] proposed a technique of classification and detection of brain tumor using DenseNet and recurrent Neural Network. Initially dense convolutional neural network was used for feature extraction from axial slices. Then obtained features from multiple slices are fed into RNN for classification. Analysis is finished in data knowledge set; public dataset contains 233 images and proprietary dataset contains 422 images. This is an alternate approach for classification of growth using holistic 3D imaging pictures. Pixel-wise or slice-wise labelling isn't required.

Sathi [4] projected a hybrid feature extraction technique with artificial neural network (ANN). Firstly, the growth cell region is segmented by using stripping husking with intensity thresholding and region labelling. After that, the

segmented growth cell region is detected by using the canny formula and so the options of the detected growth cell space are utilized because the input of the ANN classification network for classification. For feature extraction DWT and GLCM were used. The achieved classification accuracy shows higher performance comparison with some existing strategies that use completely different classification algorithms with hybrid or single feature extraction strategies.

Z. Jia [5] proposed a Fully Automatic Heterogeneous Segmentation using Support Vector Machine (FAHS-SVM) for brain tumor segmentation based on deep learning techniques. An Extreme learning machine algorithm for the classification and feature extraction of MRI images is proposed. The process involves data preprocessing, skull-stripping, morphological operation, segmentation, and feature extraction. SVM is used for classification.

P. K. Ramtekkar [6] proposed a system model to develop an automatic system which works on Magnetic Resonance images of infected brain to detect and classify brain tumor using deep learning techniques and Convolution Neural Network classifier. Both test dataset and training dataset will undergo several steps; Image segmentation using PDE method, extracting features using GLCM and PCM, Detection of tumor using CNN. Various classification methods are compared and concludes with its advantages and disadvantages.

K. Abbas [7] proposed LIPC based methodology for brain tumor classification and segmentation. 3D image dataset was used. Data pre-processing includes thresholding-based method and histogram specification. Feature extraction and feature reduction using PCA method are done. LIPC (Local Independent Projection-based Classification) has been used for classification of brain tumor which provides better and satisfactory accuracy among other methods.

T. Chithambaram [8] proposed an interactive CAD system for tumor classify. Here use two datasets with totally different kind of tumors. The tumor regions are marked by content based mostly active contour (CBAC) model. Genetic rule and ANN techniques are taking part in vital role within the detection. GA choose the best options that improves the general accuracy.

S. Das [9] proposed a tumor detection system using CNN. Data set used consists of 233 patient details. Then data pre-processing was done using Gaussian filter and histogram equalization, later classification using CNN has been done. Once developing the CNN model, the model is compiled with Adam optimizer. it's a very powerful improvement rule used for training deep neural networks. An accuracy rate of 94.39% has occurred from this model. Regularization technique is projected within the model to avoid overfitting problem.

Zahra Ali [10] proposed a replacement technique for choosing a major set of options because the input to the classifier, known as mutual information-accelerated singular value decomposition (MI-ASVD). First, the MR images smoothened by using improvement techniques like Gaussian kernel filters. The second step is that the local difference in intensity-means (LDI-Means) clustering is utilized to segment and discover suspicious regions. The grey-level run-length matrix (GLRLM), texture, and color intensity options are used for neoplasm feature extraction. Later, a special technique as well as a summation of feature choice and spatiality reduction, MI-ASVD, is applied to pick the foremost helpful options for the classification method. Finally, the simplified residual neural network technique is enforced to classify the man brain pictures.

3. CONCLUSIONS

The work provides the knowledge concerning completely different doable techniques in varied technologies which may most likely applied within the tumour detection. The suggestions planned by the works of those individuals provides a deep data within the field of classification and learning. AI, Machine Learning and its subsets are providing big selection of potentialities to resolve a tangle in multiple ways in which using completely different techniques and improved and increased algorithms. Image Classification techniques may be converted into object detection by applying the improved algorithms that are totally different techniques.

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