ABSTRACT:

In the medical field, medical image fusion plays an important role in diagnosis of brain tumours that may be classified as malignant or benign. To cut back uncertainty and minimize redundancy whereas extracting all the helpful info from the supply pictures, it's the method of grouping multiple pictures of the identical scene into one united image. SVM is employed to fuse 2 totally different visions and brain tomography pictures. The image united is going to be a lot more informative than the pictures from the supply. The image united allows us to extract the characteristics of texture and wavelet. Based on supported trained and tested options, the SVM Classifier classifies brain tumours. The planned technique achieved sensitivity of 80.48 percent, accuracy of 99.69 percent and specificity of 99.9 percent. Experimental results obtained from the fusion method show that the utilization of the planned approach to image fusion shows higher performance compared to standard fusion methodologies.

Keywords: Brain Tumor, Segmentation, Magnetic Resonance Imaging

[1] INTRODUCTION

In regular medical applications such as virus diagnosis and treatment preparation, medical image processing has advanced as one of the critical factors. The technical restrictions, degrading the accuracy of human interpretation and lack of more medical image analysis are various reasons due to which the quality of medical images is usually unsatisfactory, thus requiring an improvement in the quality of these images. One approach to improving image quality is to denoise images.

Numerous denoising methods have been planned, such as adaptive filters, methods built on wavelets. Different effective technique is the fusion of images that advances image quality.
by merging the comparable information from multimodal images into a sole fused image. This resulting image is called a fused image. A fusion process is a combination of residual information to synthesize an image with added information than a specific image and a synthesized image is more suitable for visual observation. Image fusion is the technique of merging many input images from the similar brain into a sole fused image that conserves whole content information and holds significant features from distinctly original images. Compared with the specific image, the fused image should have more advantageous information content. For the most part, radiologists select side-by-side MR and CT images when both images are available. This gives them all the information available on the image, but their accessibility is limited to the visual correlation between the two images. It is conceivable to use both CT and MR images as it is hard to govern whether tissue or bone causes tapering of a spinal canal. Corresponding information is provided by both the CT and MR modalities. The images must be rationally aligned and fused organized in order to accurately visualize the associated bone and soft tissue structures. This process primes to better interpretation and usefulness of data. The source image is merely overlaid by conveying it to different colour channels in fundamental multimodal image fusion procedures. This overlay approach is used in colour image fusion to raise the amount of information over a single image, but it does not disturb the contrast of the image or distinguish the features of the image. We suggest novel region-based image fusion algorithms for multifocal and multimodal images that also disables the limits of different methods.

[2] METHODS

A. Existing Methods

- Image fusion process based on Discrete Wavelet Transform (DWT) [1].
- Hyper spectral Image fusion process based on Principal Components Transform (PCT) [2].

B. Proposed Methods

In this planned system, Medical image fusion associates different modality of medical images to produce a high pixel fused image along with spatial & spectral information. The fused image with additional information upgraded the performance of image analysis algorithms used in different medical diagnosis applications. SVM is used in this paper for brain image fusion and K-Clustering features are mined from the fused brain images. The brain tumour region is segmented using the extracted features and SVM classifier helps to identify whether the tumour is “benign” or “malignant”. Thus, it benefits the physician and radiologist for brain tumour diagnosis for human surgical treatment.

C. Sequence Diagram

An object relationship settled in time sequence is displayed in a sequence diagram. The sequence diagram illustrates the objects and classes tangled in the situation and the sequence
of messages traded between the objects required to carry out the functionality of the scenario. These diagrams are also called event diagrams/event scenarios.

![Block Diagram](image)

**Figure 1: Block Diagram**

[3] **USE CASE**

Use cases are a set of scenarios which explains an interface between user and system. A use case diagram expresses bond between actors & use cases. The two important components are a user and alternative system that will intermingle with the system modelled. A use case is a peripheral view of the system that denotes few actions the user might accomplish in order to complete a few tasks.

[4] **ALGORITHM DESCRIPTION**

- **MEDIAN FILTERING**
  - Median filters are used for denoising the image.
  - It’s a significant process for image Enhancement.
  - Noise reduction is a process of image processing to advance the results of future image processing.
  - It conserves edges even though removing noise in image processing.
● **SVM ALGORITHM**
- SVM or Support Vector Machine is a supervised machine learning algorithm.
- Statistical and nominal data are the two data types that SVM uses.
- If we assume n to be the number of features with the assess of each feature being the specific coordinate then using this information, we can plot the data item as a point in n-dimension coordinate system.

The two classes are separated by finding the hyper-plane between them because of which classification is accomplished.

**Proof.** Support Vector Machine is most suitable in case of image processing.

[5] **METHODOLOGY**
- **PREPROCESSING**- Preprocessing the input MRI.
- **IMAGE REPLACEMENT**- By denoising the MRIs using the procedure called Median Filter.
- **FEATURES EXTRACTION**- Mining the morphological features by using the k-means clustering procedure.
- **THRESHOLDING**- In addition thresholding is done on the extracted image. Thresholding is the simplest technique of image breakdown. Binary images are generated from grayscale images by using thresholding.
- **SEGMENTATION**- Then segmentation process is carried out for further performance improvement to identify whether the tumor is malignant or benign.

![Figure 2](image-url)
SVM- After all this, SVM (Support Vector Machine) classifier is used for classification as well as regression. The tumor is classified into malignant or benign class by SVM classifier.

[6] RESULTS

We developed a Brain Tumor Detection system using machine learning in MATLAB(R2018a).

It detects tumor type based on training dataset.

[7] CONCLUSION

Medical image fusion combines different modality of medical images to produce a high-quality fused image with spatial and spectral info. The fused MRI with more information improves the performance of image analysis algorithms used in various medical diagnosis applications. SVM is used in this paper for brain image fusion and K-Means Clustering mines the features from the brain MRI. The brain tumour region is segmented using the extracted features and adaptive SVM classifier helps to identify whether the tumour is malignant or benign. Thus, it helps the physician and radiologist for brain tumour judgement for human surgery.

REFERENCES


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