COMPREHENSIVE ANALYSIS OF TECHNIQUES USED TO ENHANCE THE MRI IMAGES FOR DISEASE DETECTION

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ABSTRACT

Image processing provides efficient way to detect disease from within the image. In order to detect the disease clarity within the image must be enhanced. This work present comprehensive analysis of mechanisms used to enhance the MRI image. The enhancement is desired since there could be noise present within the image. Noise handling mechanisms are many. This work attempts to disclose best possible techniques associated with image processing to enhance them for further exchanges. Parameters such as mean square error and accuracy that can be used for enhancement are also elaborated through this work.

Keywords: Image processing, MRI images, MSE, Accuracy

1. INTRODUCTION

Image enhancement and detecting disease from the MRI image is the need of the hour. In order to to do several techniques is being devised. This paper presents comprehensive analysis of disease detection mechanism from the MRI images. [1]Magnetic resonance imaging is one of the common source for providing on the go information about the disease carried by the patient. The problem starts to appear when noise appears within the captured image. [2]This noise can appear due to many reasons within the MRI images. The Noise tackling strategies are present within almost every tools of image processing used. Most commonly used tool for noise detection and problem tackling is MATLAB image and signal analysis toolbox.

[3]Noises which are common in MRI images are Salt and pepper noise along with Gaussian noise. Salt and pepper noise appears within the image when intensity level of the pixel within the image exceeded 255 or falls below 0. Due to this noise, white spots appear within the MRI image. Clarity of the image is totally lost due to the application of this noise. The noise handling mechanism which is employed for handling such noise is median filter. Salt and pepper noise is also known as impulse noise and prime cause of such noise is temperature.

Gaussian noise is encountered by the application of probability density function. The probability density function does not mix with the frequency of the pixels involved. The Gaussian noise can be fixed using Gaussian filter. [4], [5]The wiener filter is another common filtering mechanism detecting and preventing the Gaussian noise from within the image.

Histogram equalization is used to enhance the contrast associated with the image. The image clarity and contrast enhancement strategies are used to make the MRI image readable and hence problem of mean square error and peak signal to noise ratio is completely eliminated.

The proposed work will detect the inter pixel redundancy and eliminate them by the use of buffer method. The buffer method will store the value of the pixel which is already plotted. The next time same pixel is destination again then that pixel will be rejected. The model will be described in the next section

2. The Model

The model that can be considered to deal with the redundancy within the image by removing the inter pixel redundancy present within the image. The size of the image will be reduced by the use of proposed model. The redundancy of the image sometimes may distort the image. The distortion of such type is known as white effect. This will make the image distort and clarity of the image is lost. In order to solve the problem buffer method is presented. The buffer method will store the pixel already being plotted.

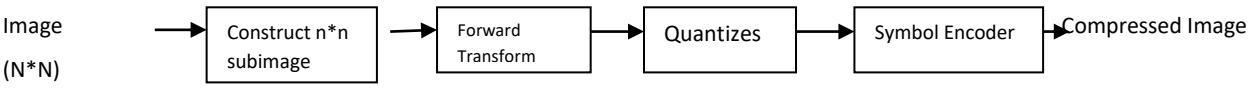

Fig1: Showing the model for image compression

The compressed image will be passed through the buffer and determined whether the pixels are redundant or not. The redundant pixels are eliminated from the image. The symbol encoder will contain the buffer redundancy handling mechanism also. So the proposed work using the above said model will reduce the size of the image and provide the compressed image with less redundancy. The compression ratio is also improved.

3. RELATED WORK

There are number of papers which described the problem of redundancy in images. In order to build the base we analyze number of such papers. Some of the papers which we have studied will be described in this section. Redundancy will make certain portion of the image much brighter than the other portion of the images. [6] this paper consider the compression technique for jpeg images. The jpeg images are common extension for the images which are being transferred. The transferred images will be compressed so that image should not take much space over the transmitted medium. The transmission media will charge expenses if the data transferred are large. So compression is requisite. Discrete cosine transform is used in this case to compress the image. If image is compressed properly than less bits per image is requisite to represent the image. Hence the mechanism of image compression will help in decreasing the cost associated with the image storage. [7] In addition to the redundancy image processing also contains the problem of noise. This considered paper considers the impact of noise on the image. The impact of noise will cause distorted image. [7]Image denoising via sparse and redundant portrayals over learned dictionaries will be considered in this case. The advantages of the redundancy will be shown. In other word the positive side of the redundancy will be considered in this case. [8] There are number of types of redundancy which are present within the image. The pixels will have large spaces in between the pixels. This is known as inter pixel distance. In order to reduce the distance compression techniques are followed. In order to efficiently compress the images compression techniques are used. Compression technique which is suggested in this paper includes lossless and lossy compression. The redundancies which are considered are inter pixel, coding and Psycho ocular. [9] The image compression will be considered in this case. Image compression is requisite so that the space requirements can be reduced. The image compression will be requisite to reduce the redundancy. The type of redundancy which is considered in this case will include Psycho ocular. This redundancy indicates sensitivity to distinguished images by human eye. So some unnecessary information from the image can be rejected. [10] Image compression techniques are considered. The image compression will be used so that relatively less pixels should be used in order to represents the image. Sometimes image does not contain any relevant data. In that case that

irrelevant information has to be eliminated. This is accomplished with the help of compression techniques. [11] The concept of medical images is considered in this case. The MRI is a form of images which are used in the area of medical field. Various types of redundancies are present within the images. These redundancies are eliminated by the use of compression techniques. In this paper the area of concern is medical images. [12]The study of various image compression techniques are considered in this case. Principal Component Analysis technique is considered in this case. Image f(x,y) is fed into the encoder, which creates a set of symbols form the input data and uses them to represent the image. If we let n1 and n2 denote the number of information carrying units(usually bits) in the original and encoded images respectively, the compression that is achieved can be quantified numerically via the compression ratio. The main area of concern is Huffman coding, LZW coding etc. PCA technique suggested in this paper is based upon two factors data reduction and interpretation.

The main focus of all the papers studied is data compression and reducing the redundancy present within the image. The techniques which are suggested within the papers are very complex and time consuming.

4. PROBLEMS OF EXISTING SYSTEM

The problem associated with the existing approach is features extraction through the complex images. In order to tackle the issue, some mechanism to reduce the overlapping and redundant pixels can be proposed in future endeavors. The parameters that can be used for enhancement which are missing in existing system is given as under

Mean square error is calculated using subtraction process of feature values extracted and features extracted from original values. This metric should have minimum value.

$$MSE = \frac{\left(x - \frac{x}{n}\right)^2}{n}$$

Here n is the total number of pixels within the image. X is the actual intensity value.

Time Complexity: This metric indicates the time taken in order to reach to the conclusion. This metric should be minimized for betterment of result.

$$Time = Finish_{time} - Start_{time}$$

Peak signal to noise ratio is high if noise in the image is low. This parameter hence should be maximized.

$$PSNR = 10 * log_{10}\left(\frac{R^2}{MSE}\right)$$

5. Conclusion and future work

There are problems which are associated with the existing approach corresponding to disease detection. In order to reactify the issue, some modification to existing literature is required. The proposed system checks the benefits and limitations of existing system and provides the stretegies and parameter evaluation that can be used for future enhancements. The MRI images analysis and detection of diseases is a prime concern of

this paper.

This paper also presents measurement mechanism associated with various metric for determine which metric can be evaluated efficiently with least time hence enhancing performance.

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