International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 3 | ISSN : 2456-3307

# Gray Medical Image Compression Using Fractal Concepts

**Biswajit Senapati[1], Sumitra Kisan[2], Subhra Priyadarshini Biswal[3], Anmol Pattanaik[4]**

[1,2,4]M-Tech Research Scholar, Department of Computer Science and Engineering, Veer Surendra Sai University of Technology, Sambalpur, Odisha, India

[2]Assistant Professor, Department of Computer Science and Engineering, Veer Surendra Sai University of Technology, Sambalpur, Odisha, India

## ABSTRACT

Digital image processing is now more popular due to high quality of image. In digital image compression is more popular due to providing high compression ratio. In this paper we discussed fractal images compression methods. Medical, industry, animation is used compression methods for extracting information. Because these images are contain huge amount of information. Then it is very difficult to send large amount of information through any physical or communication medium. Therefore we use some techniques for compressing the information. Information is extracted through images. Image may contain any types such as JPGE, PNG and TIFF etc. Here we discussed the image encoding and decoding methods, image types and survey paper. It is shown that some parameters such as Compression ratio (CR), Peak Signal to Nation Ration (PSNR) is calculated and also histogram graph of each image is shown.

**Keywords**: Fractal Images, Peak Signal to Noise Ratio, Compression Ratio

## I. INTRODUCTION

Fractal image is self-similar in nature which is repeated at each level. In this modern world image compression is a very important technique in multimedia. Generally fractal is like an object which has infinite resolution. Fractal image is used to define and illustrate the objects which are naturally occurs. It provides image which we normally see in nature. It acts as never ending patterns. There are two types of techniques available for these image compressions which are lossless and lossy method. In lossless method will method, the decompressed images are identical to the original image. In lossy techniques will produce image which are very close to the original image. Here we are using two parameters for the compression of image (i.e. compression ratio and peak signal ratio). There are so many types of image are available which are given in below.

i) **JPEG-** It stands for joint Photographic Experts Group. This file helps to compressed lots of information in small size file. This type of files provides very poor quality of graphics, logo, line drawing etc.

ii) **PNG-**It stands for Portable Network Graphics. These types of files are mostly used for web images.

iii) **GIF-** It stands for Graphic Interchange Format. The supports lossless type compression.

iv) **TIFF-** It stands for Tagged Image File Format. These types of images are uncompressed. It supports very large size of files. In this paper we are divided our contain in this manner such as literature review, flow chart, calculation, experiment, result of compression and decompression, output, conclusion and references

## II. LITERATURE REVIEW

### 2.1 A Novel Technique of fractal image compression using neural networks for MRI image [2017]

G.V.Maha Lakshmi al [1] discussed fractal image compression using back propagation neural network. Here MRI image is divided into two processes such as encoding and decoding process. In encoding processing contain two blocks such as domain and range block. It shows compress the MRI image information in encoding block .Similarly in decompressed MRI image information is decompressed in reverse order. Finally result is calculated such as peak signal noise ratio and compression ratio.

### 2.2 Fractal Coding based on Image Local Fractal Dimension [2005]

Aura Conci and Felipe R. Aquino al [2] discussed fractal coding of image for self-similar in nature. First step it is analyzed of image then identified the complexity of image then compute the fractal dimension. Then it is comparing between the domain block and range block. Finally it was calculated the fidelity test such as root mean square error, signal to noise ratio and peak signal to noise ratio.

### 2.3 Adaptive PIFS Model in Fractal Image Compression [1996]

Murray H. Loew, Dunling L al [] presented gray scale medical image. Here data is extracted by the help of quad tree and also identifying a given image through partitioned iterated function system algorithm. Lossless compression technology is applied on local area of domain block. In preliminary stage is checking the compression ratio then experiment new algorithm by checking compression ratio of medical image.

### 2.4 Fuzzy Clustering for Fractal Image Compression with Applications to Digital Angiography [1995]

Dietmar Saupe, Meinrad Rombach al [3] discussed digital image compression by using fuzzy logic. Here lossy image compression technique is taken .Large portion of domain block is comparing with small portion of range block and finding best matching among two blocks. When two block is matched then it form same cluster. Then some parameters are calculated. In this paper is presented improve the quality of reconstruction time .Therefore we get better quality of image.

### 2.5 Fractal Image Compression [1993]

Yuval Fisher al [4] presented the various types of image compression technique and methods. How image is compressed, type of images, structures and internal structure of image .It contain mathematic models and design technique for internal structure of image compression .It contains the represent of fractal images in the form of graphs. Encoding time and decoding time is varied from one to another image etc.

### 2.6 Image coding Based on Fractal Theory of Iterated Contractive Image Transformations [1992]

Arnaud E. Jacquin al [5] discussed monochromatic images. Data is extracted by the help of vector Quantizes. It contains encoding and decoding time of image. It contain basic mathematic model of domain block and range block. Then data is represented in the form of mid-range, Shade-range and Edge-range .How the image is varying form one iteration form to another iteration form. Finally result is calculated through bit rate and peak signal to noise ratio of monochromatic image.

## III. FLOW CHART

### 3.1 Encoding steps

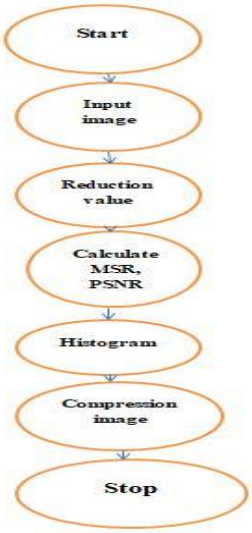



**Figure 1.** Encoding image

### 3.2 Decoding steps

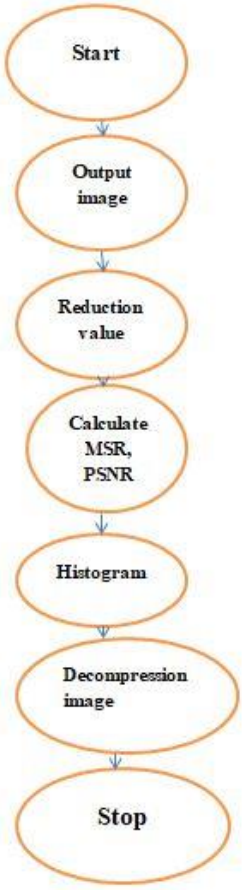



**Figure 2.** Decoding image

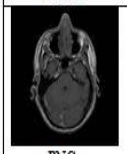
### 1. Calculation

- ✓ Mean square error = sum ((sum)(err*err))/(256*256)
- ✓ Peak signal to noise ratio =10*log10 (255^2)/Mean square error
- ✓ Compression ration = uncompressed image/compressed image

### 2. Experimental

In this table we show that different types of image format with two parameters such as Peak signal to noise ratio and mean square error. Mean square error is defined as the error between two images. Mean square error is divided into three types such as luminance value, Chrominance values. Luminance is defined as the brightness of an image. Chrominance is defined as color information of an image. Chrominance blue is defined as blue color information and chrominance red is defined as the red color information of an image

**Table 1.** parameters of image compression

| Types of images | Mean square error | | | Peak signal to noise ratio |
|---|---|---|---|---|
| | Luminance | Chrominance red | Chrominance blue | |
|  JPGE | 0 | 214.8 | 0.47 | 29.50 |
|  PNG | 0 | 221.4 | 0.15 | 25.43 |
|  GIF | 0 | 189.12 | 0.34 | 23.44 |
|  TIFF | 0 | 196.027 | 0.23 | 28.52 |

### 3. Result of compression and decompression

Here we show the image compression value an decompreesion value of medical image with histogram.Compression of medical image value is 2.59kb and decompression value is 3.18kb

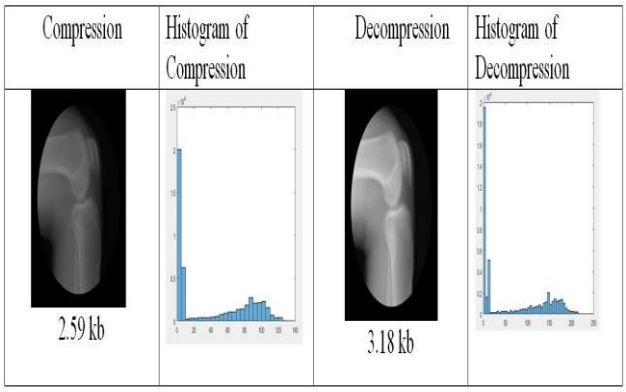



**Table 2: jpeg image compression and decompression with histogram**

### 4. Output

Compression ratio = uncompressed image/compressed image

=2.89/2.55 kb

=1.13 kb

## IV. CONCLUSION

Comparing different types of image in jpeg image, we got that Peak signal to noise ratio is higher than other image format. So we got that jpeg is better format for compression and decompressing information of gray scale image. In future we can improve the image quality and better compression ratio value by changing the value of image compression parameters.

## V. REFERENCES

[1]. G.V.Maha Lakshmi, "A Novel Technique of fractal image compression using neural networks for MRI image", International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 6, Issue 2 February 2017.

[2]. Aura Conci, and Felipe R. Aquino, "Fractal Coding based on Image Local Fractal Dimension", In Proceedings of Computational & Applied Mathematics, Vol. 24, No. 1, 2005.

[3]. Murray H. Loew, Dunling Li, and Raymond L. Pickholtz., "Adaptive PIFS Model in Fractal Image Compression", In Proc. of SPIE, Vol. 2707, 1996.

[4]. DietmarSaupe, Meinrad Rombach, and Harald Fischer, "Fuzzy Clustering for Fractal Image Compression with Applications to Digital Angiography‖, In Proceedings the Third European Congress on Intelligent Techniques and Soft Computing EUFIT'95, Aachen, Aug. 1995

[5]. M. F. Barnsley, and L. P. Hurd, Fractal Image Compression. AK Peters‖, Wellesley, 1993.

[6]. A.E. Jacquin,"Image coding Based on Fractal Theory of Iterated. Contractive Image Transformations", IEEE Transactions on Image Processing, 1992.