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# Enhanced False Coloring in Medical Image Processing

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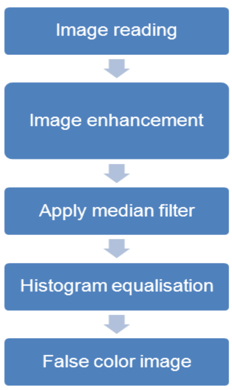
***Abstract— our study on false colouring encompasses its technological value in medical application. The extensive features of MATLAB have been utilized via its false colouring. The X-Ray medical images carry number of overlapping attributes which in one sight is not clearly like bones, ligaments, muscles, tissues and etc. Grey scale has number of similar variations and our eye can able to map things with corresponding colours. With use of false colouring images we can track such attributes and can able to plot the histogram and stats. Entropy and PSNR are taken as mandatory parameters which are in fact preliminary to evaluate the image's processing level by level.***
***Keywords—X-Ray scanned images converted to Gray scale.***

## I. INTRODUCTION

The introduction of Medical images has created breakthrough in medical field. Moreover, with the help of MATLAB things get more flexible and better of processing Medical images. Since it has been known that in X- Ray images only perceive grey shades can be perceived. Normally, our retina is subjected to 40 shades of grey colour. Also our eyes has easy read in detecting edges of dark hues like Violet, Indigo, Blue and Green. Organs and tissues within the body contain magnetic properties. MRI, or magnetic resonance imaging, combines a powerful magnet with radio waves (instead of X-rays) and a computer to manipulate these magnetic elements and create highly detailed images of structures in the body. Images are viewed as cross sections or "slices" of the body part being scanned. There is no radiation involved as with X-rays. MRI scans are frequently used to diagnose bone and joints' problems. Demonstrating the false colouring algorithm and plotting histograms, equalized alike parameters and generating false colouring figures with applying median filters. When former steps of non-allocating paged information with clear command is performed then that image has to be read and converted to grey scale. Size is calculated by assigning values in three variables. Now the matrix is assigned with these variables and the traversing is done by inner looping. Correspondingly, the pixel's range is examined and accordingly the assigning of grey shade is performed. Then it is followed by plotting of figures with equalized histogram is performed. Also entropy and PSNR is calculated for three medical images and the comparison with the base paper's results is drawn.



## II. Assumption

- It has been assumed that medical images are in grey scale for 2D image processing.
- The image processing algorithm for enhancing of an image, described and tested is very much equivalent to, used in our base paper study, using hardware description language, Verilog.
- In the image processing algorithm, the values of the grey-level have been represented on the 8-bit field. This new range of colours can be built based on any kind of rules, in order to mark some specific areas.

Table 1– Generalized range of respective Colour shades

| **Intensity range** | **Shades** |
|---|---|
| 160-255 | White |
| 120-159 | Pink |
| 50-119 | Brown |
| 0-49 | Dark |

- The values mentioned above are pre-defined facts and they are logically getting its increment as it proceeds from 0 to 255 with dark proceeding towards white shade.
- The figure mentioned below has been the result of number of predecessor processes primarily median filter applied in the former stage then attributed with false coloring.

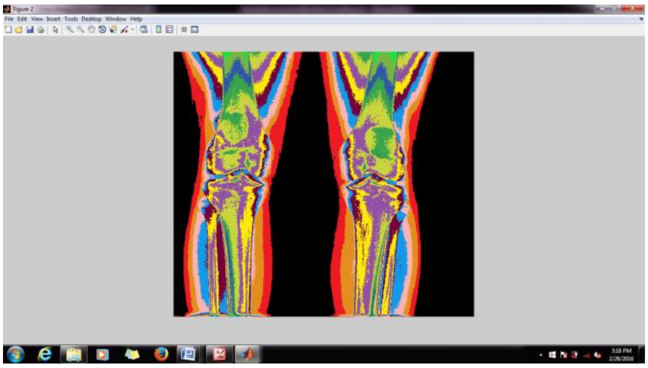


*Figure 2– Entropy of False Colored Image of Knee with Pictorial View*

The tabular form as mentioned below clearly metric result of medical image of knee which comprises parameters like **PSNR, Entropy, Average CPU time (ns)**. Average CPU time is calculated by averaging

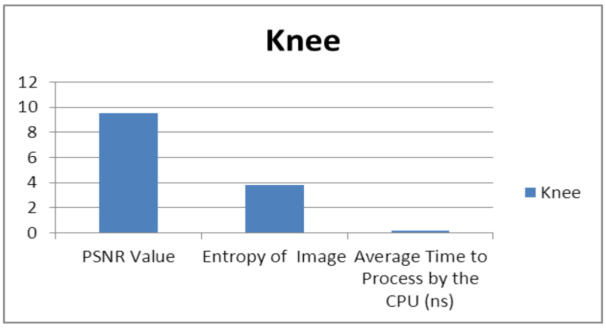



Figure 1– Corresponding Histogram of the Table 1.

## III. Equations

Entropy is a statistical measure of randomness that can be used to characterize the texture of the input image. Entropy is defined as

$$E = \text{sum}\,(p*\log_2(p)) \quad \ldots\ldots\ldots\ldots.. (1)$$

To calculate the PSNR the resulting image PSNR the resulting image i.e. the false-colour image is converted back to the grey scale image and call it as the recovered image. PSNR is calculated between the original image and the recovered image. It is measured to show the perceptual quality of the recovered image. Larger the PSNR value, more similar is recovered image to the original image. This image is outlined as:

$$PSNR = 10 \log_{10} (255*255)/MSE \ldots\ldots\ldots (2)$$

## CONCLUSIONS

The medical image sector needs more exposure with MATLAB's full capability of utilising false colour algorithm. With the use of Autodesk Lustre, R, Python Language, graphics libraries can be properly exploited and also will be helpful in building up multiprocessing system. This algorithm can be further ported to Mobile App platform (iOS, Android, etc.) to make more usable and quick. An application can be developed for enabling quantitative analysis and visualization of medical images of numerous modalities An analysis tool, researchers at remote sites (via the internet) can easily share research data and analyses, thereby enhancing their ability to research, diagnose, monitor, and treat medical disorders. Also horizontal scaling of the hardware plays an important role in driving image processing of high quality (H.Q.) images with smoothness. The scalability of adding co-processor or new hardware in distributed system configuration can hence be predicted with number of executions required involved in the image processing. The fundamentals of false coloring will be used in medical images' application where clear diagnosis of tissues, ligaments, traces of blood and bone marrow are clearly drawn. Our system will take an approach forward by evolving an existing system and introducing notable new features. The capability of hardware could be calculated to process image by differentiating calculus and then an extraction of colors could be performed. With this it could be compared the performance throughput of hardware. If it is unable to fulfil the minimum criteria then coprocessor or distributed computing will act as a helping end. Moreover let's say an original image has a resolution of 4K, and hardware supporting modern APIs like AMD Mantle is capable to process it to maximum 1366 x 768 then with an image convertor suitable application it can be scaled down for **At least View** then on an addition of secondary hardware an original image could be constructed. So here three programming languages will be used for specific purposes. C and C++ – It will analyse the hardware benchmark and its details will be maintained in log file. MATLAB – According to the final conclusion an explicit values could be set for image processing. Also another key feature of the proposed system is fusion of parameters spatial and time. As it has been known that spatial is space which is **(x, y, z)** and time is **t**. So when combining these parameters it can be mathematically obtained as **(x, y, z, t)**. It means a kind of 4D image processing is obtainable. Each frame will be processed in each and every instance of time. This will ensure greater accuracy and notable difference when image is being processed. When no change occurs in the difference of co-ordinates then only one copy can be retained for image processing. The complexity of our algorithm is very judgmental in the pre-processing phase. Hence it saves expensive cycles when image processing fails

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## REFERENCES

[1] Alan Krueger, "The Evolution of Rotation Group Bias: Will the Real Unemployment Rate Please Stand Up?" August 2014.

[2] Apurva B. Parandekar, S.S.Dhande "A Review on Changing Image from Grayscale to Color" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 3, Issue 1, January 2014.

[3] B. Abidi, Y. Zheng, A. Gribok, and M. Abidi, "Screener Evaluation of Pseudo-Colour Single Energy X-Ray Luggage Images," Proc. of IEEE Conference on Computer Vision and Pattern Recognition, Workshop CDROM, San Diego, CA, USA, June 2005.

 

[4] Besma R. Abidi, Yue Zheng, Andrei V. Gribok, and Mongi A. Abidi, "Improving Weapon Detection in Single Energy X-Ray Images Through Pseudo coloring," IEEE Transactions On Systems, Man, And Cybernetics—Part C: Applications And Reviews, Vol. 36, No. 6, Pp. 784-796, November 2006.
[5] C.B. Tatepamulwar,“ Detection and Identification of Human Skin Diseases Using CIElab Values” , International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 6, June 2015
[6] Chung-Yen Su, Chi-Ming Lin “Effective False Color Suppression of Demosaicing Using Direction Inversion and Bidirectional Signal Correlation” National Taiwan Normal University, IEEE 2007.
[7] Cheng-Hsiung Hsieh, Chih-Ming Lin, Fung-Jung Chang “Pseudo-coloring with Histogram Interpolation” 2009.
[8] David R. Martin, Charless C. Fowlkes “Learning to Detect Natural Image Boundaries Using Local Brightness, Color, and Texture Cues” IEEE Transactions On Pattern Analysis And Machine Intelligence, VOL. 26, NO. 1, January 2004.
[9] Guo Shijian, Sun Gang “A New Pseudo-coloring Coding Method for DPX Image” Fourth International Conference on Digital Manufacturing & Automation, 2013.
[10] Hiroaki Sugiura, Katsumi Asakawa “False Color Signal Reduction Method for Single-Chip Color Video Cameras” IEEE Transactions on Consumer Electronics, Vol. 40, No. 2, May 1994.
[11] Zhijiang, Li Jianping Liu “Dynamic Range Compression and Pseudo-Color Presentation based on Retinex for SAR Images” 2008.
[12] Jakia Afruz, Va’Juanna Wilson “Frequency Domain FALSE-color to Enhance Ultrasound Images” Computer and Information Science Vol. 3 , No. 4 , November 2010.
[13] Jeff GRANT “Generating Color Scales in SAS®: 256 Shades of RGB”,2016.
[14] J. H. Jang and J. B. Ra “FALSE-Color Image Fusion Based on Intensity-Hue-Saturation
Color Space” IEEE School of Electrical Engineering & Computer Science, August 2008.
[15] Jingyi Qu, Ying Du “Pseudo-Color Coding Based on Visual Model and Perceptual Space “The Institute for Cognitive Neurodynamics, Information Science and Engineering Department, East China University of Science and Technology, Shanghai, 2011.

 