Saturation Component In HSB Color Space With Image Processing Methods To Enhanced Image Segmentation

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abstract
With the scientific advances witnessed by many branches of science, one of the most important of which is medical diagnosis, there is a role for digital image processing, a primary role that helps doctors increase the accuracy of the diagnosis, where diagnosis can be made through the coloring of one of the organs in the body with a specific color, indicating that this organ suffers from a specific disease. Likewise, the increase in the size of this organ or the smallness of its size are all indications of the injury of this organ with a specific disease. Therefore, it became necessary for the medical image to be highly visible. Also, the required member was taken out of the captured image. In the process of diagnosing the disease, therefore a method was presented in this paper that helps to improve the process of cutting any part of the image with high accuracy through the use of digital image processing techniques and reliance on the saturation layer in the HSB color system.

1. introduction.

Digital image processing technologies play an important role today in prominent areas in many of the most important of them are the medical field, the human body contains a group of organs and the cell that can be taken a picture of and then studying this image thus determining whether this member has a disease or not[1]. One of the most important topics of medical diagnosis is brain tumors, as a result of the tremendous increase in people with this disease. Statistics in the World Health Organization show that approximately six million and hundreds of thousands of patients, according to reports for the year 2000, types of brain tumors differ, but it is always very important that early detection of this The tumor helps a lot in the treatment process. There are tumors that occur in brain tissue and other sites in the brain[2-3].

The process of distinguishing any object within an image or choosing any important part in order to conduct a specific study on that part requires in the first step is to truncate that part of the image[4,5]. The process of truncating any part of the image depends on the required study, meaning that any part of the image can be truncated depending on its color or shape[6].
The image clipping process is one of the most important branches of digital image processing. There are several methods used in the image clipping process, Figure (1) shows the most important techniques used in the cutting process[7].

![Image Segmentation Method](image.png)

**Figure (1) : image segmentation techniques**

The research section is divided into five paragraphs. The first paragraph talks about the digital image. As for the second paragraph, it is clear how to convert the color system. In the third paragraph, the steps of the proposed algorithm were reviewed, and the fourth and fifth paragraphs where the results were reviewed and the most important conclusions obtained.

2. **digital image**

The types of digital images differ in terms of the number of bits that represent each type of these images, where the binary image needs one bit to represent because its color is only white or black[8,9], and the image with a gray hue it needs 8 bits to represent it because the number of colors is 256, As for the colored picture, it needs 24 bits to represent it because it consists of three layers of color, each layer needs 8 bits to represent it, so the number of colors is 16777216[10,11]. The following figure is among the main types of digital image.

![Digitat Image](image.png)

**Figure (2): Main Type Of Digital Image**
4. Color space

One of the most famous color systems for digital color pictures is RGB. In this research, we rely on the HSB color system. The following figure shows the conversion between the two systems as well as below are the equations used in the conversion process[12,13].

\[
HUE = \begin{cases} 
0 & \Delta = 0 \\
60 \cdot \frac{(G - R) \mod 6}{\Delta} & \Delta > 0 \\
60 \cdot \frac{(B - R)}{\Delta} + 2 & \Delta = 0 \\
60 \cdot \frac{(R - G)}{\Delta} + 4 & \Delta < 0 
\end{cases}
\]

\[
saturationn = \frac{\Delta}{1 - |2 \cdot Brightness - 1|}
\]

\[
Brightness = \frac{(Max + Min)}{2}
\]

When R=Red/255, G=Green/255, B=blue/255, Max = Max(Red, Green, Blue), Min = Max( Red, Green, Blue).

5. Suggest algorithm

The following figure(4) show flowchart of suggest algorithm.
6. Result

In this paragraph we will review the application of the proposed algorithm to a different set of images, the following figure (5) shows.
Figure (5) : application of the proposed algorithm

7. Conclusion

Diagnosis of diseases is considered one of the most important topics that scientists always try to find ways to lead to the diagnosis process at a high level of accuracy in order to make accurate diagnosis of treatment also. A color scheme gives a layer to the saturation that was taken advantage of after improving it by using digital image processing methods and using it as a mask. This mask was applied to the three basic color layers (red, green, and blue). This method was applied to a group of images and the tumor site was in different parts of the brain, the result of the application was all the images that were used, the tumor was cut out.

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