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Color Conversion in Remote Sensing Images Using K-Means Clustering Algorithm

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A B S T R A C T

Color plays an important role in image processing. This paper presents the comparative study among HSV, YCBR, NTSC color models in the clustering of remote sensing image by combining different color bands. K-means is the oldest and most commonly used clustering algorithms. It is a prototype based clustering techniques. It's defining the prototype in terms of a centroid which is considered to be the mean of a group of points and is applicable to objects in a continuous n-dimensional space. The aim of this paper is to propose an easy to implement methods for color conversion using K-Means clustering. The results are made using clustering result and various color conversions. The color spaces used are HSV, YCBR and NTSC.

Keywords: image, color spaces, RGB, HSV, YCBR, and K-means clustering.

1. Introduction

Color is the most vital visual feature for humans. This paper describes the various color space methods and also applying the clustering concepts. In this diagram represent the how to work the color conversion models and clustering algorithm. The RGB color is a preservative color model in which red, green, and blue light are added collectively in various ways to reproduce a broad array of colors. A remote-sensing image is defined as an image created by a recording device that is not in objective or close contact with the object under study. In this work we have to find RGB color band of the original image. After that the original images converted into three different color spaces. The name of the color spaces are HSV, YCBR and NTSC. The K-means clustering algorithm is implemented in the HSV image. Execution of the original K-means clustering is very simple.

Conversion of input image to output image is very easy. It is used for all input pixels, the nearest cluster is found by linear search over all clusters. The value of the output pixel is then the position of this cluster. This measurement of the implementation is very simple and ineffective, and large speedups can be gained by performing other than linear search. At last the silhouette value is calculated. This work aims to look at some components of image Clustering methods in arrange to get the best component that will improve the value of image clustering outcome.

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2. Methodology

Color is the most vital visual feature for humans. This paper describes the various color space methods and also applying the clustering concepts. In this diagram represent the how to work the color conversion models and clustering algorithm. The color space methods are followed by RGB to HSV, RGB to YCBR, RGB to NTSC.

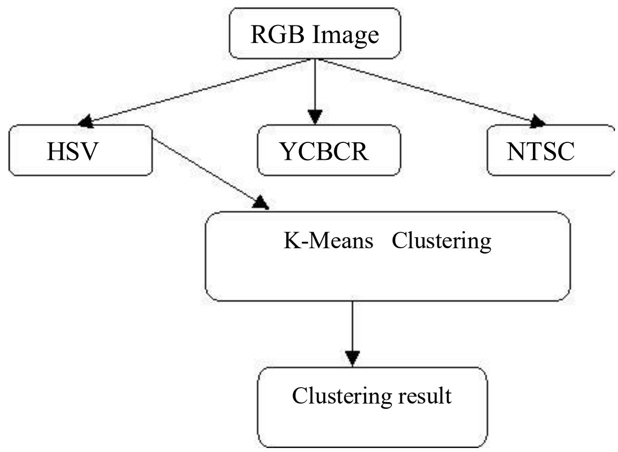

Fig. 1 – System Architecture

2.1 RGB to HSV COLOR MODEL CONVERSION

The HSV model stands for the Hue, Saturation and Value and also called HSB (Hue, Saturation, and Brightness). It defines a color space in terms if three components, Hue represent the color type, Saturation represent the power of exact color, Value represent to the intensity of the color. The transformation equations for RGB to HSV model is given below

$$V = \max(R, G, B)$$

2.2 RGB to YCBCR COLOR MODEL CONVERSION

In this model Y is the luminance part and Cb and Cr are the blue-difference and red-difference chroma mechanism. Converts the true color image`RGB` to the equivalent image in the YCbCr color space. RGB must be a`M`-by-`N`-by-3 array. The conversion equations from RGB to YCbCr color model is given below.

If the input is`uint8`,`YCBCR` value is`uint8`, where`Y` is in the range`[16 235]`, and`Cb` and`Cr` are in the range `[16 240]`. If the input is a double, `Y` is in the range `[16/255 235/255]` and `Cb` and `Cr` are in the range `[16/255 240/255]`. If the contribution is`uint16`,`Y` is in the range`[4112 60395]` and`Cb` and`Cr` are in the range `[4112 61680]`.

2.3 RGB TO NTSC COLOR MODEL CONVERSION

The conversion is m-by-3 RGB values in `rgbmap` to NTSC color model. `Yiqmap` is an `m`-by-3 matrix that contains the NTSC luminance (*Y*) and chrominance (*I* and *Q*) color mechanism as columns that are equal to the colors in the RGB color map. In the NTSC color space, the luminance is the grayscale pointer used to display pictures on monochrome (black and white) televisions. The other mechanisms carry the hue and saturation information.`Rgb2ntsc` define the NTSC mechanism using,

$$\begin{bmatrix} Y \\ I \\ Q \end{bmatrix} = \begin{bmatrix} 0.299 & 0.587 & 0.114 \\ 0.596 & -0.274 & -0.322 \\ 0.211 & -0.523 & 0.312 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

3. K-Means Clustering

Clustering involves the undertaking of dividing information points into standardized classes or clusters. So that items in the same class are as comparable as possible and Items in changed classes are as dissimilar as possible. Given a collection of objects, place items into groups based on comparison.

3.1 Clustering

Clustering can be measured the most essential *unsupervised learning* difficulty; so, like every other difficulty of this kind, it deals with choice a *structure* in a collection of unlabeled data. A movable definition of clustering could be "the process of organize objects into groups whose members are comparable in a number of way". A *cluster* is a result a set of items which are "similar" between them and are "dissimilar" to the objects belonging to other clusters. We can show this with a simple graphical example

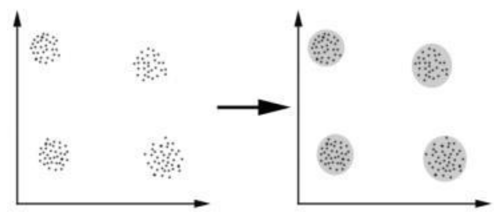

Fig- 2 Clustering

3.2 Algorithm

K-means is the simplest unsupervised learning algorithms that answer the well identified clustering problem. The process follows a simple and easy way to organize a given data set through a certain number of clusters (assume k clusters) fixed a priori. The major idea is to describe k cancroids, one for every cluster. These cancroids be supposed to be located in a cunning way because of dissimilar location causes dissimilar result. So, the improved option is to place them as much as likely far away from each other. Following step is to take each position belonging to a particular data set and connect it to the near centroid. When no position is pending, the first walk is finished and an early on collection page is done. At this point we need to re-calculate k new centroids as barycenters of the clusters resultant from the before step. After we have these k new centroids, a new necessary has to be done between the same data set points and the nearest new centroid. A circle has been generated. As a outcome of this circle we may note that the k centroids alter their position step by step until no more change are done. In additional terms centroids do not shift any more. The algorithm is composed of the following steps:

- *Put K points into the gap represented by the objects that are being clustered. These points represent opening group centroids.*
- *Allocate each one object to the group that has the next centroid.*
- *After all items have been assigned, recalculate the positions of the K centroids*
- *Show again Steps 2 and 3 until the centroids no longer move. This process a partition of the objects into groups from which the metric to be minimized can be calculated.*

While it can be proved that the process will forever terminate, the k-means algorithm does not essentially locate the mainly best configuration, matching to the total objective function minimum. The algorithm is also notably sensitive near the initial randomly chosen cluster centres. The k-means algorithm can be run several times to decrease this effect.

4. Experimental Results

We have evaluated our algorithm on several datasets. We have compared our results with direct k-means clustering algorithm in terms of the number of performed silhouette value is calculated.

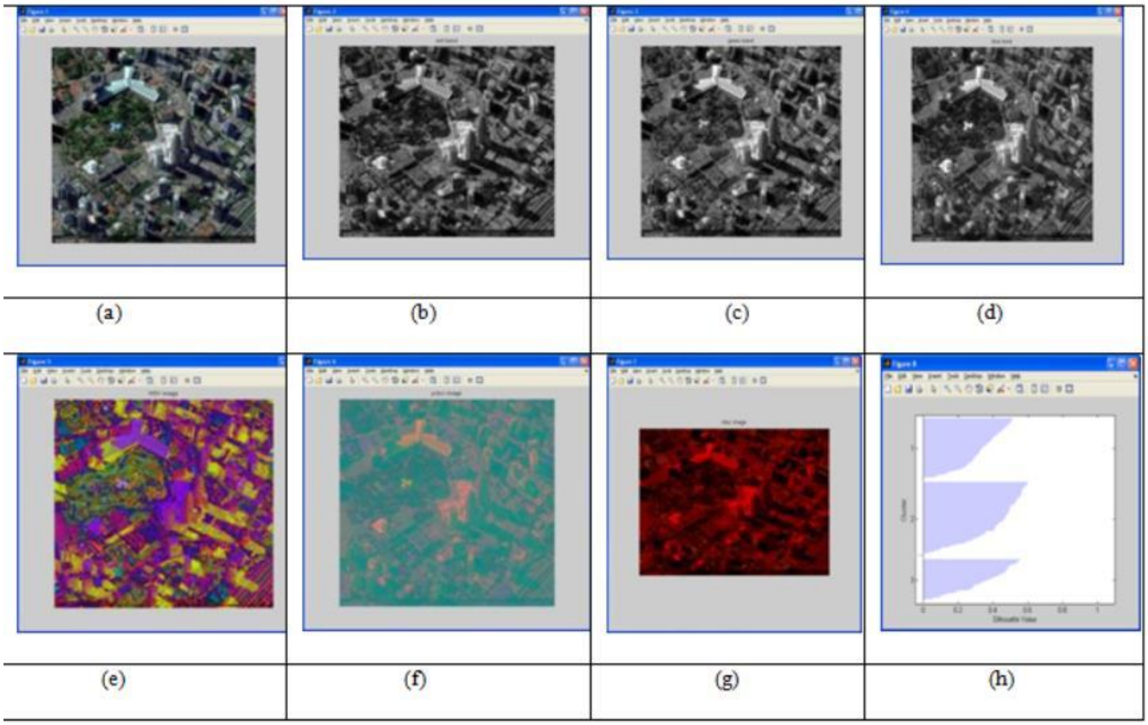

Fig-3 (a) Input Image, (b) Red band Image (c) Green Band Image (d) Blue Band Image (e) RGB to HSV (f) RGB to YCBR (g) RGB to NTSC (h) Silhouette Value

5. Conclusion

This study aims to some image clustering algorithms based on color conversions. In the image clustering methods, there are three major mechanisms that will manipulate the presentation of the algorithm, which are color spaces, image representation and clustering methods. Experimentation results prove that we will have different presentation as we mingle methods in every one component.

References

[1] Jian-Jiun Ding, The class of "*Time-Frequency Analysis and Wavelet Transform*", the Department of Electrical Engineering, National Taiwan University (NTU), Taipei, Taiwan, 2007.h

[2] Jian-Jiun Ding, The class of "*Advanced Digital Signal Processing*", the Department of Electrical Engineering, National Taiwan University (NTU), Taipei, Taiwan, 2008.

[3].Amita Sharda, "Segmentation of Medical Images Based on LS-SVM using Low Level Features" International Journal Of Engineering Sciences & Research Technology, Sharda, 2(8): August, 2013, ISSN: 2277-9655 Impact Factor: 1.852

[4].Color Image processing, " Derivation of HIS-TO-RGB and RGB-TO-HIS Conversion Equations", Gonzalez and woods, Digital Image processing,1st,ed.Addison-Wesely,1992

[5].C.Sasi varnan, A.Jagan, Jaspreet Kaur, Divya Jyoti, Dr.D.S. Rao, "Image Quality Assessment Techniques pn Spatial Domain" IJCST Vol. 2, Issue 3, September 2011 ISSN: 2229 - 4333.

[6] Chang Y (1994), X. Li, "Adaptive Image Region Growing", IEEE Trans. On Image Processing, Vol. 3, No. 6, 1994.

[7] D. Chaudhuri and A. Agrawal, "Split-and-merge Procedure for Image Segmentation using Bimodality Detection Approach" Defence Science Journal, Vol. 60, No. 3, May 2010.

[8] Deepak Kumar Dewangan and Yogesh Rathore, "Image Quality Costing of Compressed Image Using Full Reference Method" ISSN 2231-3907 (Print) 2231-3915 (Online).

[9] Dirk Holz and Sven Behnke, "Fast Range Image Segmentation and Smoothing using Approximate Surface Reconstruction and Region Growing" In Proceedings of the 12th International Conference on Intelligent Autonomus Systems(IAS),Jeju Island,Korea,2012.

[10] Dr. P. Raviraj, Angeline Lydia, Dr. M. Y. Sanavullah, "An Accurate Image Segmentation Using Region Splitting Technique" GESJ: Computer Science and Telecommunications 2011| No.2(31) ISSN 1512-1232.