# Evaluation of Crop Fields from Hyperspectral Images Using Optimized Methods

**Dr.P.Tamije Selvy, S.Sam Peter**

*Abstract:* **The Advancement of new high resolution satellite imagery has greatly increased our ability to monitor land cover changes from space. The Investigation approach is used to increase the efficiency and timeliness of the crop fields in the Landscapes with the use of Hyperspectral Remote sensing images. There were several methods used to enhance the quality and components of the satellite images to remove noises, geometric and radiometric errors. In this system, Color histogram method is used to enhance the image set and to remove the noises and disturbances in the satellite image. Then the images are used to extract the features for the classification of the crop fields in landscapes. This system improves the precision and recall rate of the hyperspectral image set.**

***Keywords: Hyperspectral Images, Image Pre-processing, Color Histogram.***

## I. INTRODUCTION

Remote sensing, particularly satellites offer an immense source of data for studying spatial and temporal variability of the environmental parameters. Remotely sensed imagery can be made use of in a number of applications, encompassing, creation of mapping products for military and civil applications, evaluation of environmental damage, monitoring of land use, radiation monitoring plan, urban planning type, growth regulation of crop, soil assessment, and crop yields [1]. Generally, remote sensing offers imperative coverage, mapping and classification of land-cover features, namely vegetation type, soil types, water and forests reservoir. Researches on image classification based remote sensing have long attracted the interest of the remote sensing community since most environmental and socioeconomic applications are based on the classification results [2]. A principal application of remotely sensed data is to create a classification map of the identifiable or meaningful features or classes of land cover types in a scene. Therefore, the principal product is a thematic map with themes like land use, geology and vegetation types [3].

The multispectral airborne as well as satellite remote sensing technologies have been utilized as a widespread source for the purpose of remote classification of vegetation [5] ever since the early 1960s. Owing to the development of airborne and satellite hyperspectral sensor technologies, the limitations of multispectral sensors have been overwhelmed in the past two decades. Hyperspectral remote sensing imagers obtain several, very narrow, contiguous spectral bands all through the visible, near Infrared, mid-infrared, and thermal infrared portions of the electromagnetic spectrum [4]. Hyperspectral images have taken a significant part in extensive applications of water type resource management, agriculture and environmental maintenance. A widespread research and development has been performed in the field of hyperspectral remote sensing.

**Dr.P.Tamije Selvy,**
***Associate Professor,***
***Department Of Computer Science and Engineering,***
***Sri Krishna College Of Technology,***
***Coimbatore, India.***
**S.Sam Peter,**
***PG Scholar,***
***Department Of Computer Science and Engineering,***
***Sri Krishna College Of Technology,***
***Coimbatore, India.***

In general, real-time constraint of machine vision require fast algorithms and smaller data storage. Color is a very important cue in extracting information from an image, and color histogram comparison has recently become a popular technique for image and video indexing. The popularity of color as an index resides in its ease of computation and effectiveness. Using color in a real time system has several relative advantages: color information is much faster to compute than most other “invariants” and it can be nearly invariant to changes in orientation and small partial occlusions of the object.

Swain and Ballard [4] suggests that color is a reasonable efficient method for identifying objects of known location, and locating objects of known appearance and practical to use color for high-speed image location and identification. Note that even though claims that a color histogram is largely independent of resolution, the experimental work shows it is not independent of resolution changes that includes blurring.

Unfortunately, even though the color histogram has been shown to be an important tool in image indexing it has been used mostly with fixed image databases. Furthermore, known distance measures for the recognition process that can handle large variations in scale and illumination are computational expensive because the histogram is typically a high-dimensional distribution. Moreover, indexing on such a high-dimensional feature for large image databases, it is generally not feasible to compute the match measure against every image. Thus to seek a much lower dimensional feature set while seeking to insure it maintains low levels of false detection and false rejection. Proposed system uses the location of color histogram peaks, a simple to compute distance measures between the color images, and show that these are much more stable than histogram distance measures for certain fairly general cases (including for large illumination and resolution variations). The system will show, similarity retrieval based on the histogram peaks measure achieves both the goals of efficient and effective recognition system.

## II. DATASETS:

The Dataset consists of Land Remote-Sensing Satellite images taken from different time and various geographical regions around the globe.

## III. COLOR HISTOGRAM:

The reduction of the vast amount of information in images is one of the biggest barrier for recognition in real time. The ease of recognition in real time depends on this reduction and on the speed/accuracy of an image retrieval system which uses feature for describing images and matching strategy. For this purposes, the system reduced the color information of each image to a compact representation by using the color histogram peaks and used retrieval strategy in Fig 1.

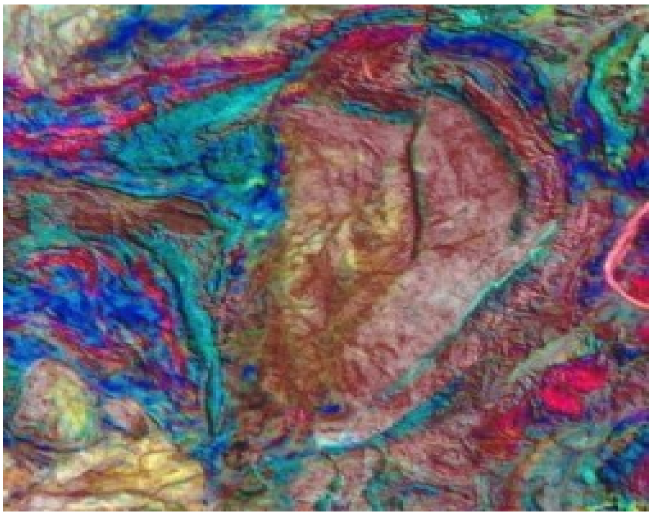


Figure 1. Hyperspectral image contains RBG color

In an image-processing context, the color histogram of an image normally refers to a multi-dimensional histogram of the pixel color values, i.e. the distribution of color in the color space. Computing them is easy; a primary difficulty is the high cost computing a similarity distances between such the query histogram and all the images in a databases. The histogram feature needs to provide a discriminating capability between images which contain several objects to the query while still finding the correct object when there have been changes in illumination, scale and location of objects.

Even though some examples of color feature for object recognition have been used, existing color features do not support all the requirements for an image retrieval engine, especially the size of the database and computational demands of indexing. While the color histogram preserves considerable color information contained in an image, it is not well as compact a representation of image representation as needed for enabling small mobile machines. In contrast, the color histogram representation by peaks allows to create a very useful compact representation of color histogram for real-time applications on small machines. For traditional color histograms, it is difficult to maintain stability for information while changing resolution, scaling, and illumination. Using this measure, two images may be considered to be very different from each other even though they have completely related semantics. This investigated a color histogram peaks indexing scheme where computationally efficient features are used for recognition instead of more sophisticated techniques.

The color histogram is a method for describing the color content of an image, it counts the number of occurrences of each color in an image Color model describes colors in a formal way according to a certain specification. Usually color models represent a color in the form of tuples (generally of three). For example, according to RGB (Red, Green, Blue), white color is represented by the tuple (0, 0, 0) and the black color is represented by (255,255,255). The purpose of a color model is to facilitate the specification of colors in a certain way and common standard [9].

## IV. TABLES AND FIGURES

The figures shows the input of the Hyperspectral image set which consists of raw image.

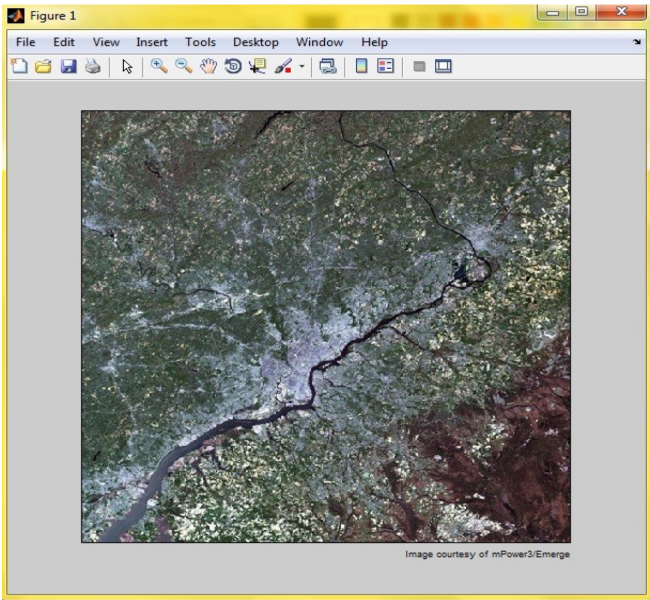



Figure 2. Input Image

The fig 2 shows the input image used for the processing of the image enhancement process and removes the unwanted noises in the satellite images.

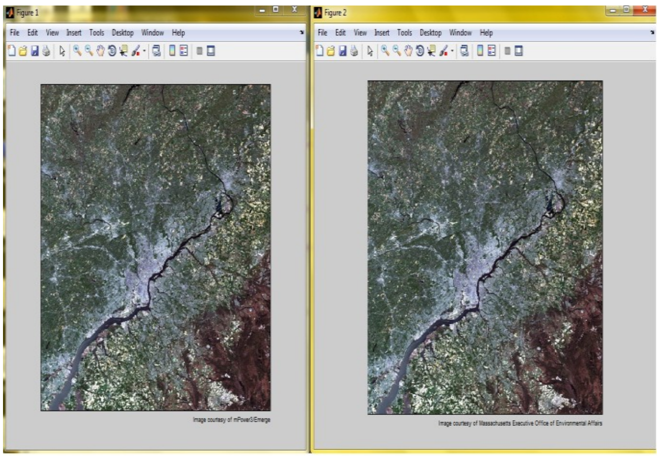


Figure 3. Color Histogram process

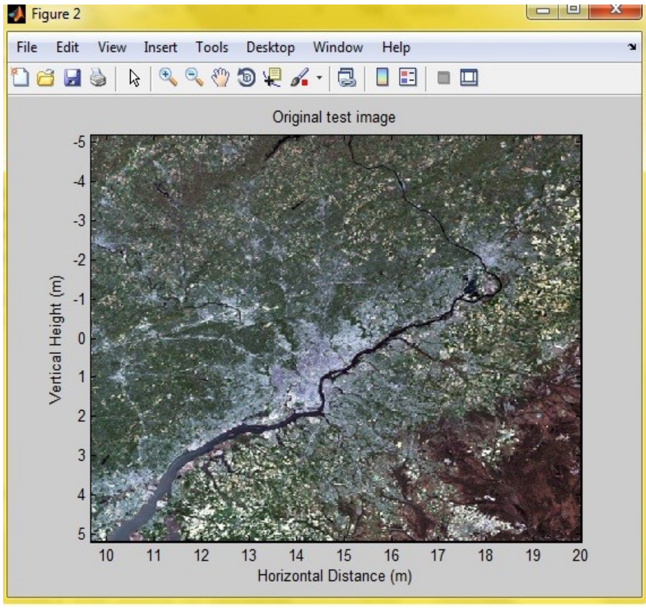



Figure 4. Geometric variations

The fig 4 shows the variations between the current and potential in the Image set. Using these image set, it access the module set of the input set and its constraints.

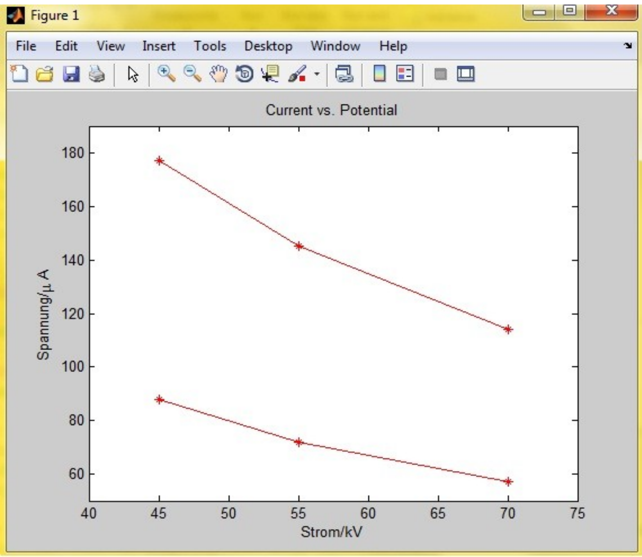
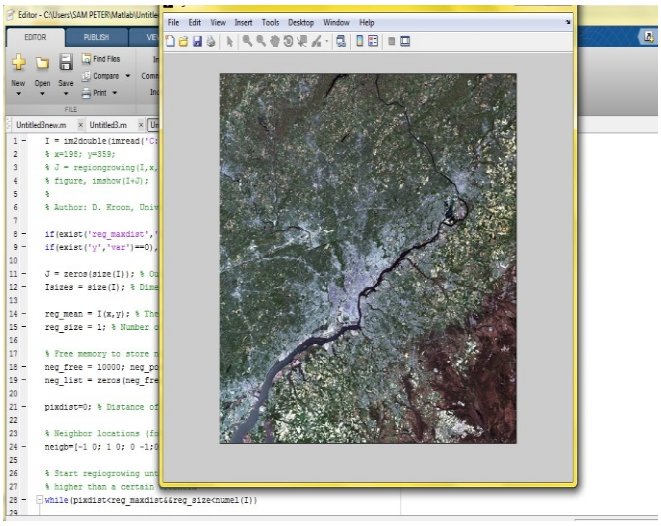



Figure 5. Rate of Color modules in Image set

The fig 5 shows the module between the strom and the segmented form of the module in the satellite image modules in the data set. The system uses the ratio for the histogram module of the red, blue and green color module in the enhancing of the Image set.

The fig 6 shows the processing of the input image in the color histogram segmentation of the satellite images.



s

Figure 6. Preprocessed Output Image

The table gives the average precision and recall value of the several types of algorithms used in the Image Enhancement system.

Table I. The Average value of Precision and Recall in various Algorithms

| ALGORITHMS | AVERAGE PRECISION | AVERAGE RECALL |
|---|---|---|
| GLOBAL AND LOCAL ENHANCEMENT | **0.24** | **0.33** |
| HYBRID DIRECTIONAL LIFTING | **0.35** | **0.44** |
| DISCRETE WAVELET TRANSFORM | **0.29** | **0.39** |
| COLOR HISTOGRAM | **0.40** | **0.47** |

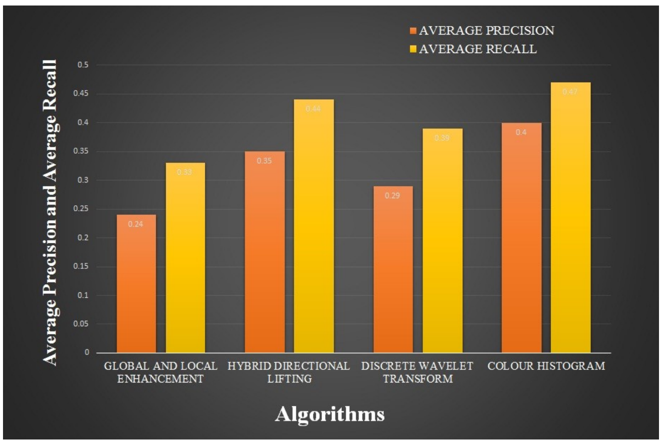



Figure 7. Average Rate ratio

## V. Conclusion

This paper has proposed an evolutionary method for enhancement of the satellite images using the Color Histogram method. The system uses histogram method to remove noises and errors in the Input image. Then the enhanced image is used for feature extracted and Classification of the Crop fields in the large scale. Our implementation has been far superior to the existing system in terms of Accuracy, Sensitivity. However there is still Scope for improved performance in the system by using optimized techniques in future.

## References

[1] B.V. Ramana Reddy, A. Suresh, M. Radhika Mani and V.Vijaya Kumar "Classification of Textures Based on Features Extracted from Preprocessing Images on Random Windows" , International Journal of Advanced Science and Technology , Volume 9, August, 2009

[2] T. Sree Sharmila, K. Ramar, and T. SreeRenga Raja, "COMPARATIVE ANALYSIS OF SATELLITE IMAGE PRE-PROCESSING TECHNIQUES", Journal of Computer Science, 9 (2): 176-182, 2013 ISSN 1549-3636

[3] G. Anbarjafari, and H. Demirel, 2010 '"Image super resolution based on interpolation of wavelet domain high frequency sub bands and the spatial domain input image", ETRI J., 32: 390-394. DOI: 10.4218/etrij.10.0109.0303

[4] M. J. Swain and D. H. Ballard, "Color indexing, " International Journal of Computer Vision, vol. 7, no. 1, pp. 11–32, 1991.

[5] M. Stricker and M. Orengo, "Similarity of color images", Proceeding of SPIE Storage and Retrieval for Image and Video Databases III, vol. 2420, pp. 381–392, 1995.

[6] J. Lee and B. W. Dickinson, "Multiresolution video indexing for sub-band coded video databases, " Proceeding of SPIE Storage and Retrieval for Video Databases, vol. 2185, pp. 321–330, March 1995.

[7] B. M. M. M. S. K. A. D. Narasimhalu and G. C. Man, "Color matching for image retrieval," Pattern Recognition Letters, vol. 16, pp. 325–331, March 1995.

[8] M. K. M. T. A. S. Panchanathan, "Image indexing using moments and wavelets," IEEE Transactions on Consumer Electronics, vol. 42, pp. 45–48, August 1996.

[9] R. Lenz and P. Meer, "Illumination independent color image representation using log-Eigen spectral," tech. rep., Department of Electrical Engineering in Linkoping University , October 1997.

[10] H. Shawney and J. Hafner, "Efficient color histogram indexing, " International Proceeding 1994 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, pp. 66–70, 1994.

[11] M. D. E. M. Riseman and B. A. Draper, "Focus: Searching for multicolored objects in a diverse image database", International Proceeding, pp. 756–761, 1997.

[12] S. F. Chang and J. R. Smith, "Extracting multi-dimensional signal features for content-based visual query" SPIE Symposium on Visual Communications and Image Processing, May 1995.

[13] A. R. Smith, "Color gamut transform pairs, " In Proceeding of SIGGRAPH Published as Computer Graphics, vol. 12, pp. 12–19, 1995.

[14] D. Travis, Effective Color Displays Theory and Practice. Academic Press, 1990.

[15] H. Lewkovitz and G. H. Herman, "A generalized lightness hue and saturation color model," Graphical Models and Image Processing, pp. 271–278, 1993.