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A STUDY ON HYPERSPECTRAL DATA IMAGING BASED ON SPATIO SPECTRAL SCANNING

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ABSTRACT

Hyperspectral data is one of the important breakthroughs in remote sensing. It has a capability of separating the different and describing the objects of same size in detail. It processes the image in the large- number, narrow and it can produce data with sufficient resolution. Hyperspectral images used to identify the spectral information and differentiate unique materials. It also provides the information by the means of very accurate and extraction of various information that relates to remote based information. Hyperspectral remote sensing purpose is to measure the various components of the Earth system that is acquired as images for scientific applications and research purpose. Hyperspectral remote sensing can be categorized the information into two ways: Feature space and Spectral space. The feature space method is not efficient because the data dimension is determined to describe the patterns. The spectral based is used for extracting anomalous pixel vector at endmember extraction. This will validate the both synthetic and real Hyperspectral data images. The scatter matrix that is preserved in the means of pixel by spatial domain and the projection of optimal discriminative is obtained with the help of scattering of spectro-spatial thus maximizing a modified scatter of information.

Keywords – Hyperspectral Image, Spectral space, Spatio- Spectral scanning.

I. INTRODUCTION

Hyperspectral data images contain a various types of images in order of collecting the information. Each and every image represents the electromagnetic spectrum and it is also referred as spectral band. The images are grouped into three dimensions (a,b,c) where spatial dimension of the scene represents by a and b and spectral dimension represents by c of the image. Each photon of light has a wavelength and it is determined by its energy level. The wavelength can be described in the forms of light and electro magnate radiations.

The given wavelength can be much greater and the micron values are between 0.4 and 0.7 in the light visible shown in Figure 1. Hyperspectral remote sensing that are capable of capturing spectral channels narrowly in a resolution of spectral, so that it leads to clearly understand the structure of images [1]. The problem creation is clearly explained in both theoretical and practically in spectral domain shown in Figure 2.

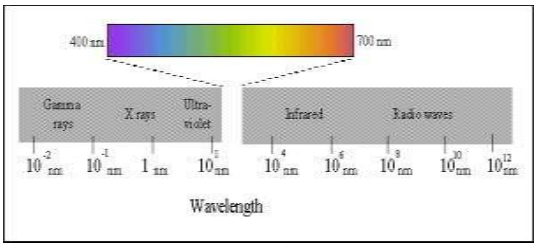

Fig. 1. Two- dimension projection of Hyperspectral cube and Electromagnetic spectrum

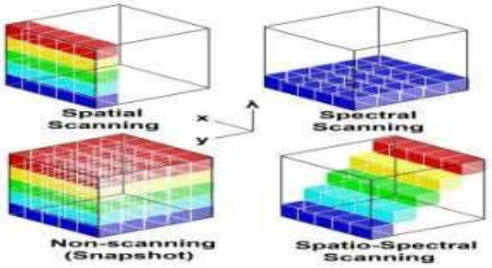

Fig. 2. Hyperspectral Datacube Visualization

It relates to unbalanced input data with the dimensional rate is high and various training samples in classification process [2]. The classifier performance deteriorates according to the various training samples, if it increases the dimensionality [3]. The reduction of dimension should be applied early of classification methods, so that it achieves a classification with a good performance. Dimensional reduction contains some important information in order of obtaining a dimensional data in a lower rate instead of obtaining a dimensional data in a higher rate. It also improves the classification problem [4,5,6]. Supervised DR methods using sample labels to learn discriminant projections, it can be determined as Linear Discriminant Analysis (LDA) [10,11]. Non-parametric weighted feature extraction (NWFE) [12] local Fisher Discriminant analysis (LFDA) [13], Local Discriminant Embedding (LDE) [14] etc.

II. REVIEW OF LITERATURE

Velasco-Forero et al., [15] has suggested the combination of spectral information and spatial information that obtained from kernel transformation for Hyperspectral image classification. It frequently tested with a very large number of training samples and its classification accuracy is better than graph based method. The cost of computational is very low so that small labelled samples are work with. The adjacency matrix produced, so that it speeds up the distance matrix calculation. The spectral-spatial relationships can be combined by the kernel with the help of both Smoothed and original Hyperspectral images. This gives better classification with lower computational cost in the proposed system.

Kang et al., [16] states an idea to achieve an accuracy of high classification maps of Hyperspectral images and its accurate segmentation. The Initial pixel wise maps appearance does not cause any difference in the filtering process, this leads to optimize a map. This framework consists of three steps, the pixelwise classifier is classified into Hyperspectral image. The repre-

senttative of multiple probability maps that is obtained from classification maps and the filtering process of edge preserving is done.

Plaza et al., [17] has introduced a technique named Morphological filtering is applied for the analysis of data in spectral information as well as spatial information of the given Hyperspectral data. In this paper, they considered various approaches for neural networks using the method DBFE. The high dimensional remotely sensed Hyperspectral datasets can be filtered and classification done for extension of morphological transformations. This kind of transformation can be applied to various problems such as classification and agriculture.

Pesaresi et al., [18] has suggested the classical approach that reduces the problem of segmentation dramatically and the intrinsic hierarchy effect that appears in the regions of images. This approach has performed in the both low spectral resolution and low radio-metric contrast. This produces an effect of border, textual effect and an ambiguity in the object.

Lennon et al., [19] illustrate the Hyperspectral image classification and the vectorial image dimension that is encountered regularly. This allows training samples and classes to be used more. It also allows high rate of classification and the various small training samples that are reached in a dimensional space at very high. The Support Vector Machine (SVM) are used to produce classification maps noiselessly and it has applied in Hyperspectral imagery to classify the images with a sample and small training sets from the sensor of airborne CASI.

Camps-Valls et al., [20] introduced a framework of classification of Hyperspectral image and it has information of both contextual and spectral data. It also leads to further development of classification process of various Hyperspectral data images. The process of function parameter tuning process as a prior knowledge on the distribution of classes. The Euclidean distance is used to calculate the spatial feature of the current pixel by use of nearest- neighbor spatial. This will also employ kernel based support vendor machines.

Mahmood et al., [21] has suggested that the Hyperspectral images are converted into RGB composite images using number of statistical methods. The most important technique PCA (Principle Component Analysis) is used to map an arbitrary number of bands into an RGB images. This method is used to reduce the partition of the bands of Hyperspectral images. The technique is used for Hyperspectral image visualization is proposed for converting the contrast enhancement procedure into HVS projection. This can improved visual inspection is done to obtain an enhanced color image.

Lennon et al., [22] states that the transformation of maximum noise fraction is used for projection of data in a transformed space. This process of filtering of signal to noise ratio allows sorted in order of new components, so that the reprojection of filtered data appears in their original space accordingly. This increases the segmentation and classification algorithm performance rapidly.

Tarabalka et al., [23] illustrated about the minimum spanning forest construction (MSF) for the region makers. The classification results are defined region makers. Each tree in a MSF grows from makers, so that it forms a region in a segmentation map. The MSF construction is evaluated with the help of dissimilarity measures and this improves an accuracy of classification. This also provides an accurate classification maps and segmentation process.

Kettig et al., [24] suggested a method of classification of digitalized multispectral image. This experiments is implemented in both satellite and aircraft methods. The training method required in conventional maximum like lihood and no-memory classifier. This can be achieving accuracy and reduce the number of accurate classification. This proposes can give greater accuracy and efficiency so that it is more desirable in many purposes.

van der Linden et al., [25] suggested a technique named Support Vector Machine (SVM) for Hyper-spectral data classification. This SVM has applied to the different level of images before the process of segmentation. The final single map that obtained from the various levels of information when it performs a multilevel approach. This achieves a greater accuracy of the value up to 88.7% and increases the size of segmentation. But it also comprises the effect of homogeneous segment based classifiers at different levels.

III. APPLICATIONS OF HYPERSPECTRAL

A. Agriculture

Hyperspectral remote sensing plays an important role of crops health, monitoring of early disease detection of crops and development of crops growth. The Precision agriculture has additional capabilities of detecting the water deficiency for the development of crops and detects the characterization of the crops.

B. Eye care

Hyperspectral photography helps to protect from eye damage because it can easily diagnosis the problem of macular edema and retinopathy. The oxygen saturation that occurs in the retina helps to identify diabetic retinopathy and glaucoma. The ophthalmology is used for validation of image for various systems from potential damage using Hyperspectral images.

C. Food Preserving

Hyperspectral imaging will enhance quality of food production and yield growth. This helps to defects foreign material and inspecting large volume of food productions. This mainly solves a product quality of potato industry and also detects sugar ends, hollow heart and common scab.

IV. CONCLUSION

In spectral-spatial domain, Hyperspectral imaging has an advantage of providing segmentation of image and more accurate classification of the image. In Hyperspectral imaging, it does not need any post processing the information that is mined from very large datasets and the prior samples. The advantage of Hyperspectral is an entire spectrum that is obtained from Hyperspectral imaging. Researchers are also finding the path to sort the data by the means of Hyperspectral satellite, so that they can transmit the necessary data.

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