Object based Classification of Satellite images by Combining the HDP, IBP and k-mean on multiple scenes

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Abstract: The goal of this system to analyze remote sensing images and classify objects into land cover or use classes. In this project classify the object based unsupervised classification of remotely sensed very high resolution (VHR) panchromatic and multispectral satellite images in which the hierarchical dirichlet process (HDP) and Indian buffet process (IBP) and k-means clustering algorithm on multiple scenes. In this framework, a VHR satellite image is first over segmented into basic processing units and divided into a set of subimages. The hierarchical structure of our model transmit the spatial information from the original image to the scene layer implicitly and provide useful cues of classification by using k-means clustering algorithm. Clustering is a popular tool for exploratory data analysis such as k-means clustering technique. K-means clustering algorithm is used to partition and analyzes the data which used the required cluster. After dividing the cluster which deciding the color of frequency by using HDP and IBP technique and then applying the color frequency by using the support vector machine algorithm (SVM). Support vector machine algorithm is used for classification of an image. After performing the classification algorithm display the spatial information with the help of deciding color frequency also it shows the percentage of every spatial information.

Keyword: Unsupervised classification, Very high resolution (VHR), Hierarchical dirichlet process (HDP), Indian buffet process (IBP), support vector machine (SVM)

1. INTRODUCTION

The classification of images is becoming more and more important in many applications, the applications of images are divided into two approaches that is first one is the supervised method and unsupervised method. The supervised method requires the availability of a training set for learning the classifier. The supervised methods offer higher classification accuracy compared to the unsupervised ones, but in some applications, it is necessary to resort to unsupervised techniques because training information is not available and the unsupervised method known also as clustering methods, perform classification just by exploiting information conveyed by the data, without requiring any training sample set. So the unsupervised method is better than the supervised method. In the paper we used the unsupervised method, to classify very high resolution panchromatic as well as multispectral satellite images in an unsupervised way, in which the hierarchical Dirichlet process (HDP) and Indian buffet process (IBP) are combined on multiple scenes. Object-based image analysis (OBIA) often consists of two steps: 1) image segmentation and 2) the classification of image objects using a classifier. The advantages of object based image analysis for analyzing high spatial resolution satellite images. And the object based has been applied successfully in land use and land cover classification. Object based images analysis of high resolution multispectral images however the classification accuracy highly depends on the quality of the image segmentation while both segmentation and classification are designed independently. The main contribution of the paper is a novel application framework to solve the problems of traditional probabilistic topic models and achieve the effective unsupervised classification of very high resolution (VHR) panchromatic and multispectral satellite images. The hierarchical structure of our model transmits the spatial information from the original image to the scene layer implicitly and provides useful cues of classification by using clustering technique, clustering is a popular tool for exploratory data analysis, such as K-means clustering technique. The k-mean clustering technique is used to apply for the segmentation. K-mean clustering algorithm is used to partition and analyze the data which used the required cluster. Initially this number of clusters is taken as starting values. Sometime images which are captures are blur or unclear so they do not return proper return but now with the help of multiple satellite it captures the multiple satellite images and splits them separately. The images are splitting or partitioning because of the avoiding the exceptions, exceptions that means large number of images is uploaded at a time then efficiency are less and time consuming is more to find actual areas. The HDP and IBP technique are used to...
decide the color for the different areas after dividing the
color performing the classifications by using support
vector machine algorithm. Hierarchical dirichlet process
very high resolution satellite image are divided into sub
images. HDP is transmitting the spatial information from
original image and provide the useful cues of classification.
Indian buffet process specially defined the sparse binary
metric with finite number of rows and unbounded number
of columns. It is used to select subset of geo-object class to
provide special regularizations. It receives geo-object and
scene classification from VHR panchromatic image.

2. LITERATURE SURVEY

1. Object-Based Unsupervised Classification of
VHR Panchromatic Satellite Images by Combining
the HDP and IBP on Multiple Scenes [1]

In this paper, author proposed, a nonparametric Bayesian
classification algorithm by combining the HDP and IBP
technique. It is used to classify the panchromatic image
automatically without the knowledge of the number of
classes in an unsupervised way. The main contribution of
this paper is a novel application framework to solve the
problems of traditional probabilistic topic models and
achieve the effective unsupervised classification of very
high resolution (VHR) panchromatic satellite images.

2. Change detection model based on
neighborhood correlation image analysis [2]

In This paper, it implements the change detection based on
object correlation image and neighborhood correlation
image. The object correlation images used multispectral
and panchromatic images but neighborhood correlation
image is used only multispectral images. This correlation
images are based on brightness values from the same
geographic area. It is used two classification algorithm i.e.
machine learning decision tree and nearest neighbor
classifier.

3. Classification of satellite images using new
fuzzy cluster centroid for unsupervised
classification algorithm [3]

In this paper, it included the several satellite image
classification methods and technique. Satellite image
classification methods are divided into three categories:
automatic, manual and hybrid. In this paper is used to
automated satellite image classification technique, it is
divided into two categories: supervised and unsupervised.

4. Multi-scale latent Dirichlet allocation model for
object oriented clustering [4]

In This paper, author proposed, the high resolution
satellite images are divided into accurate segmentation. It
is used the latent dirichlet allocation method but by using
method does not give the accurate images. So it proposed
the Markov Random field method. This method is used to
add the spatial information for accurate segmentation.

5. Automatic detection of geospatial objects using
multiple hierarchical segmentations [5].

In this paper, author proposed nova method for automatic
object detection in high resolution images by combing
spectral information. It use the morphological operations
applied to individual spectral bands. This paper proposed
object detection algorithm that formulated the detection
process as an unsupervised grouping problem.

6. Object based image analysis for remote sensing
[6]

In this paper, author proposed; present a new method for
segmenting remote sensing images based on spectral and
texture feature. It uses the local spectral histogram
representation which consists of histogram of filter
responses in a local window. It provides an effective
feature to capture both spectral and texture information.
Disadvantages of this paper it does not make use of spatial
information and the number of cluster cannot usually be
obtained directly and automatically.

7. Stick-breaking construction for the Indian
buffet process [14]

In this paper, author proposed to derive the stick-breaking
representations for the IBP. It develops slice samplers for
the IBP that are efficient, easy to implement. It develops
the analogous to Sethuraman’s seminal stick breaking
representation for CPRs.


In this paper, author proposed, unsupervised image
segmentations based on Bayesian network. Bayesian
network is more used in many areas of decision support
and image processing. There are two approaches operate
in two phases: the first phase is to make an over
segmentation which gives super pixels cards. And the second phase the super pixels by Bayesian network.


In this paper, author proposed, study of image descriptors for the classification and recognition of RSI. It included the 7 descriptors that encode texture information and 12 color descriptors that can be used to encode spectral information. It also proposed the methodology to evaluate image descriptors in classification problem by using KNN classifier.

10. Multiagent object-based classifier for high spatial resolution imagery [8]

In this paper, author proposed, the detail of preserving smoothing classifier random field. To apply the object oriented strategy in CRF classification framework. There are two main approaches are used to take the spatial contextual information Object oriented classification method which integrates the classification and segmentation algorithm and Random field method which is used the another useful classification on that can incorporate the spatial contextual information.


In this paper, author proposed LLDA model. The LLDA model handles the document clustering with labeled instance. The document labels are obtained by the user’s judgment or authentic resources.


In this paper, author proposed, a multi-target tracking algorithm under dynamic background based on TLD and multithreading. Multithreading mechanism to expand the number of tracking target. By proposed algorithm not only the rigid object but also non rigid object can be tracked. Single target tracking as well as multiple moving targets is kept at the same time.

13. A Bayesian hierarchical model for learning natural scene categories [12]

In this paper, author proposed, compares the various techniques which retrieve the high resolution remote sensing images from large remote sensing. There are described two texture descriptor such as circular covariance histogram (CCH) and rotation invariant point triplets by using the mathematical morphological tool (RIPT).


In this paper, author proposed, an unsupervised model hrLDA for automatic terminological ontology learning. hrLDA is a domain independent self-learning model that means it is very promising for learning ontologies in new domain and thus can save significant time and effort in ontology.

3. COMPARATIVE STUDY OF LITERATURE SURVEY

<table>
<thead>
<tr>
<th>Title</th>
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<tr>
<td>Object-Based Unsupervised Classification of VHR Panchromatic Satellite Images by Combining the HDP and IBP on Multiple Scenes</td>
<td>Yang Shu, Hong Tang, Jing Li, Ting Mao, Shi He, Adu Gong, Yunhao Chen, and Hongyue Du, November 2015</td>
<td>To solve the problems of traditional probabilistic topic models and achieve the effective unsupervised classification of very high resolution (VHR) panchromatic satellite images.</td>
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<tr>
<td>Change detection model based on neighborhood correlation image analysis</td>
<td>J. Im and J. R. Jensen Nov. 2005.</td>
<td>It implements the change detection based on object correlation image and neighborhood correlation image.</td>
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<tr>
<td>Classification of satellite images using new fuzzy cluster centroid for unsupervised classification algorithm</td>
<td>C. H. Genitha and K. Vani Jun. 30–Jul. 4, 2013</td>
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Multi-scale latent Dirichlet allocation model for object oriented clustering of VHR panchromatic satellite images


It proposed the Markov Random field method. This method is used to add the spatial information for accurate segmentation.

Automatic detection of geospatial objects using multiple hierarchical segmentations


It proposed nova method for automatic object detection in high resolution images by combing spectral information

Object based image analysis for remote sensing

T. Blaschke, Jan. 2010

present a new method for segmenting remote sensing images based on spectral and texture feature

Stick-breaking construction for the Indian buffet process


It develops the analogous to sethuramans seminal stick breaking representation for CPRs.

Entropy rate superpixel segmentation

M.-Y. Liu, O. Tuzel, S. Ramalingam, and R. Chellappa Jun. 21–23, 2011,

It proposed unsupervised image segmentations based on Bayesian network

Object-oriented image analysis and scale space


In this paper study of image descriptors for the classification and recognition of RSI.

Multiagent object-based classifier for high spatial resolution imagery


The detail of preserving smoothing classifier random field. To apply the object oriented strategy in CRF classification framework

An object-oriented clustering algorithm for VHR panchromatic images using nonparametric latent Dirichlet allocation

Y. F. Qi et al, 2012

It proposed LLDA model. The LLDA model handles the document clustering with labeled instance.

Probabilistic data association methods for tracking complex visual objects


a multi-target tracking algorithm under dynamic background based on TLD and multithreading

A Bayesian hierarchical model for learning natural scene categories

L. Fei-Fei and P. Perona, Jun. 20–25, 2005,

Compares the various techniques which retrieve the high resolution remote sensing images from large remote sensing.

Latent Dirichlet allocation with topic-inset knowledge

D. Andrzejewski and X. Zhu, Jun. 4, 2009,

In this paper, proposed an unsupervised model hrLDA for automatic terminological ontology learning.

4. PROBLEM DEFINITIONS

In existing system object based unsupervised classification of very high resolution panchromatic satellite images by combining the HDP, IBP on multiple scene, this paper used for the purpose of remotely scene satellite images providing the unsupervised classification for collecting spatial structural and information or it use to analyze remote sensing images and classify object into land cover or use classes example of water, soil, building, vegetation, and unknown are. In an existing system it perform the operation only on panchromatic images which return the in an gray scale format but in an proposed system it perform the operation on panchromatic as well as multispectral satellite images and it return the result both images are in gray scale format. Another problem is that lack of HDP (hierarchical dirichlet process) and IBP (Indian buffet process) method it only used to deciding the color frequency of a menus or area. It performs the operation with the help of Chinese restaurant franchise
process. But the drawback is that it required more time for processing or deciding the color frequency which is overcome in a proposed system by using a k-mean clustering technique. By using k-mean clustering technique divide the number of five clusters and this cluster divided into a number of 10 by 10 blocks so it easily find the color of frequencies. Third problem of this existing system it does not performed the operation on multiple satellite images at a time. But in proposed system it performs maximum four numbers of images at a time. It also does not show the percentage of an area in an existing system but in proposed system it show the area with the help of graph.

5. OBJECTIVES

The main objectives of the study are listed below:

1. To implement Clustering Ensemble Strategy.
2. To implement Multiple Satellite Images.
3. To implement system which work with panchromatic and multispectral.

6. PROPOSED SYSTEM

The proposed work is planned to be carried out in the following manner:

Fig. shows the basic system architecture of proposed system, In a system architecture need to upload one or maximum four image at a time these images are panchromatic as well as multispectral then all images are merging by using multiple satellite images, with the help of multiple satellite images it captures the multiple number of images those images are sometimes blur or clear so it splits the images into clear images from data set. And then generate document grid, in document grid it store details about the merging images i.e. color, texture and pixels etc. After generation document grid we will apply clustering using k-mean clustering technique.

After applying clustering technique to decide the maximum color intensity images with the help of scenes and topic sparecity and then generate the report, in generate report we will store the images as well as calculation document.

7. MODULE

In this project it included the number of three modules:

- Implementation of merge image and preprocessing.
- Implementation of generation of documents grid and clustering.
- Implementation of sence and topic sparecity, generate report.

8. IMPLEMENTATION OF MODULE
of objects before assigning their class labels. In this project implements object based unsupervised classification of remotely sensed panchromatic and multispectral satellite images. Imagery is an important problem in remote sensing applications because the resulting segmentation can provide valuable spatial and structural information that are complementary to object based spectral information in classifications. It introduces an unsupervised method that combines both spectral and structural information. This project used k-mean clustering algorithm to reduce color texture pattern to improve speed to the classification for HDP and IBP. These systems were used to cluster the regions by clustering algorithm and the cluster labels assigned to each segment in multiple scales were used to classify the corresponding pixels with a SVM classifier. This project used SVM algorithm by combining the HDP with the IBP to consider the hierarchical spatial information of satellite images and the hierarchical spatial information is show to make surely spatial consistency of the classification result.

REFERENCES


9. CONCLUSION

The goal of this system is to analyze remote sensing images and classify objects into land cover or use classes. The classification process is used as crucial step to interpret the land in many different kinds of applications. Today’s trend in classification of remote sensing images is to do object oriented or object based classification rather than classifying single pixels. This requires segmentation


