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UNUSED LANDSCAPE DETECTION FROM SATELLITE IMAGE USING DEEP LEARNING: A Review

[1]Rinisha C.P, [2]Aruna B.

[1]Student, [2]Assistant proffessor

[1,2]Electronics and communication Engineering

[1,2]College Of Engineering Thalassery, Kerala,India

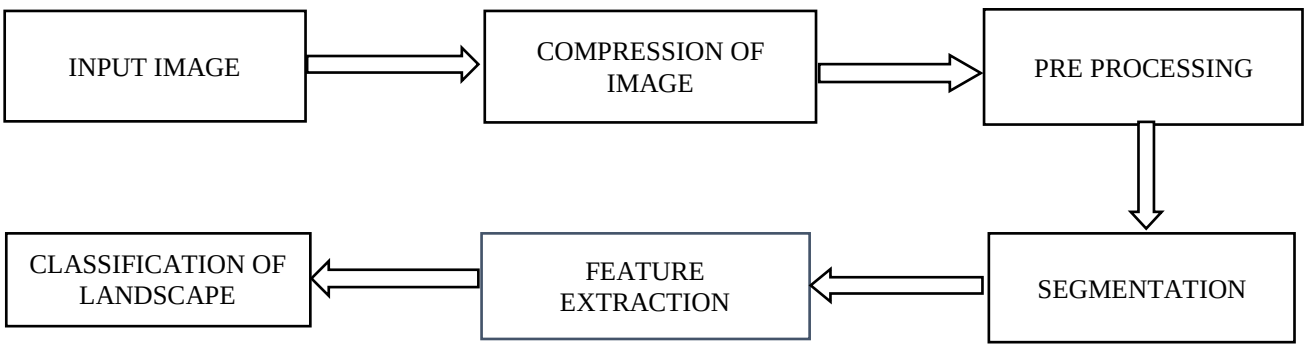
Abstract: - As the landscapes changes day by day it leads to the increasing use of unused lands, by which unused lands can be used for various purposes like agriculture, developing city infrastructure and many more. Here remote sensing earth images are taken as the dataset where the pre-processing step includes converting image into greyscale image, compression and noise removal. Segmentation is done to partition the region of used and unused lands. Feature extraction is done here using local binary feature extraction in-order to identify edge, flat and corner surfaces. As the mentioned various algorithm is used in classification and labeling of remote sensing earth images. CNN algorithm is also used for classification and labeling of classification is done automatically by the use of CNN algorithm. Random forest is used to segregate two landscapes as used and unused land which gives accuracy better than the existing systems

***Key Words*:** LBP, Region Based Segmentation, CNN, CBIR, Satellite image, Compression

I. INTRODUCTION

Satellite images are snapshots of Earth . The snapshots are taken in a digital form and these are processed by computer to extract the useful information. The satellite images are utilized to monitor the environment or surrounding condition or to notify of any disasters which can happen in future. Classification of satellite images into used and unused area. Used satellite images are further classified into residential, industries, highways, crop lands, and unused images are classified further into forest, river, deserts, and beaches. Satellite Image Processing for Detecting Unused Land Using Machine Learning will help to detect the unused land through the input of Satellite Image . Then detects and classifies as used and unused land. For classifying it includes machine learning algorithms to classify it as used and unused.

II. METHODOLOGY



various steps to be performed satellite image is taken as the input pre-processing steps to be followed. Input image is converted into grayscale as the image must be in 2-dimensional array. Noise removal is done using Gaussian Filter; it is used to remove any noisy particles in the image that may vary in the result. Segmentation is done using Region-Based Segmentation, which is used to divide into 2 regions i.e. Used and Unused area in segmentation White surface implies it is unused area and Black surface it is used area. The edge detection technique is used to extract the clear and sharp edges of objects from the input image, here 3 Edge detection techniques were used Robert edge detection, Sobel edge detection, and Canny edge detection. When compared to other 2 edge detection techniques Canny edge detection gave more accurate result compared to them. Feature extraction is done using Local Binary Pattern Feature extraction

to extract the features of corner, flat and edge surface region of the input image. Convolutional Neural Network is used to classify the land into used and unused land.

III. LITERATURE SURVEY

[1] The paper explains about the classification of the satellite images accurately using labeling of images like buildings, schools and factory. Here in this paper, the dataset they considered is an aerial view of satellite image where they need to sharpen the object so as the classification of maps be accurate as different buildings have different dimensions so inorder to make it accurate sharpening of objects technique is used. Here they have used RNN algorithm over CNN algorithm because in CNN algorithm is not suitable for the datasets they have considered, as it seems unfeasible for large scale satellite images. The labeling images are done automatically by CNN algorithm. Here the purpose of using RNN algorithm is used as labeling of images is done manually and they are trained to improve the classification of images.

[2] The paper discusses more about measures taken in image processing. The algorithms used to process multi-spectral imagery of the satellites. The image filter algorithms used for object detection and boundary delineation are shown here. The use of DSM in filtering algorithm is based on ARMR, which allows all filtering input images to form an effective algorithm. Here the three research multispectral images are collected from the Landsat 8 spacecraft to display pieces of every single frame. Eight spectral ranges are used at each processing stage of the multi-spectral imagery. The inter-frame correlation rates are from 0.61 to 0.99. They concluded that the procedures and sequences implemented new image filter. The aim of this step is to provide the chance of a coincidental estimate of brightness and the image's co-relationship properties. This helps in processing the spatial non-uniform image without conducting the labor-intensive initial segmentation. Here, as a result, it was found that the gain is up to 40% on an average distribution of predicted error. Which here helps for the initial process of satellite material for resolving the problems of image reconstruction and detecting anomalies.

[3] This paper tells about the PSO (Particle swarm optimization) and Random Forest classification they have considered Google earth imagery and multi-temporal imagery of Canadian prairies. Random Forest algorithm is used to segregate two landscapes with 90% and 100% accuracy. PSO algorithm is used for randomly selected particles that is moving in seeking the space with a speed where it is tuned with respect to its particles and behavioral in population. Based on the variety of dataset used the result depicts clearly that these techniques are better techniques to classify images based on example dataset i.e., training dataset. The comparison of results with the results of other algorithms shows that these techniques are better.

[4] In this paper details about the cross sharpening of multi temporal data. The data sets they have considered is satellite images and multi temporal data for resolution satellite imagery clear the supervisory changed detection is based on the perspective where the supervised method measures the ground cover transitions and also unsupervised methods are shown in the form of binary maps including the changes in the area if there are any here they have also used MSRG algorithm which is used for attempting the aggregate of unlabeled pixel to one of the seed region and it is automatic co registration. Generation of cross sharpened images the data sets their considered are Pan sharpened image, multi-temporal image and multispectral image. The advantages of these are it helps in image segmentation to detect the objects in the taken input of the satellite images.

[5] In this paper details about quantifying offline transformation with the use of multi-temporal satellite data and GIS technique are given. The dataset they have considered are IKNOS satellite in GST latitude and longitude of the city and it is temporal map of land use or land cover map. IKONOS satellite provides panchromatic natural color infrared and stereo images in particular this is useful for current or graphic and photogrammetric and various remote sensing applications. Here IKONOS can provide the coverage of whole globe since it offers both nadir and off-nadir modes. With the help of GIS here they have prepared the road network map which helps in labeling the data.

[6] In the paper details aerial and satellite imagery. Datasets and algorithms which they considered are ISPRS 2D semantic labeling color infrared images RGB satellite imagery multimedia images convolutional neural network CRF post processing step DB and feature for scene classification and special pooling layer. With the help of CNN algorithm it helps to classify the data set without class label as it is done automatically by algorithm. DBN feature is used in order to classify the scene of the satellite imagery which are identified as mountains or hills stations or any other nature places. Random sample consensus algorithm is used to estimate the homograph between the Google images and ISPRS data. You are the temporal changes are marked in red color that changes time to time according to the various datasets.

[7] In this paper details about the detection by classification of buildings of multispectral satellite imagery. The data sets and algorithm considered are RGB images, satellite images, multispectral images, Landsat 8 satellite semantic segmentation and CNN approach. Convolutional neural network is used for detection of objects in satellite imagery and the resulting network is used to identify the buildings in satellite images in real time scenario. Here are some of samples are shown for the result of the proposed method here they have shown the classification the detected solar power plants which helps us to estimate the energy production are also to assist the landscape planning you are the classifying network has been adopted to conduct this cement segmentation with conversion of the fully connected layer to conventional their convolutional neural network is used for road detection in this project here they train the conversion using neural network from beginning of classification which permits the model for processing of multispectral input image where can then detect by converting the fully connected layer into convolution and there which allows real time processing of higher resolution of satellite imagery. In this paper they have also shown taking the others ohm's the example and show how to classify and also detect the objects.

[8] In this paper details about taking satellite imagery as the input and extracting the features as image similarity estimation. The data sets and algorithms considered are satellite images OASIS algorithm, content based image retrieval systems, Meta heuristic algorithm, Worldview 2 and Worldview 3 satellites image segmentation mean shift clustering histogram distance computation. CBIR systems are worth by Rita in the images where input message is related from which database is where it was proposed in the difference between the features of input image and feature database image is calculated using a meta heuristic algorithm image distance is used for measuring the comparison of two images hear more important Li color is used as the only feature which can predict the distance between the image. Here the use of satellite image resolution in Huntsman technology is based on HSV hits CD conversion and wavelet transformation, allowing the spatial resolution of primary digital images to be enhanced and spectral dissertation in local areas to be avoided. The purpose of use of this algorithm is that it relates the unsupervised clustering here the main purpose of this algorithm is used to predict the kernel density of pixel distribution in RGBXY feature space, after the use of this algorithm in the satellite imagery it shows what all the object classified in satellite image are. Here the distribution of each class histogram for each images are tested in the data set which was buried, histogram represents the contextual description of images.

[9] The algorithm takes Five module method (FMM) compressed retinal images as the input. Watershed lines and canny detectors are used to find the vessel like candidate segment. Different features namely shape of the segment, position of the segment from the origin, positioning, intensity of the segment in the image, divergence, and line density are extracted for each candidate segment. Each candidate segment is labeled as normal or abnormal based on its features using Support Vector Machine (SVM) classifier

[10] Image enhancement is a process to improve the quality op-6f captured digital image by improving its contrast, light intensity & visual appearance to make it capable to use for any application or human/machine analysis. Image Enhancement can be performed in two ways: Spatial Domain and Frequency domain based enhancement. Spatial domain based enhancement involves the process of improving image quality by directly working on its pixel values. The domain of satellite image enhancement is dominated with computational intelligence & meta-heuristic based approaches. The current study has investigated all the possible statistical, machine learning, computational intelligence and meta-heuristic concepts for the satellite image enhancement.

[11] This paper improved correlaton model to jointly integrate appearance, spatial correlation, and pixel homogeneity using multiscale segmentation. It delivers competitive performance in classification accuracy against three existing methods, namely, BOVW, SPM, and the traditional correlaton model.The method wastested on a ground truth image data set of 21 land-use classes manually extracted from high-resolution remote sensing images. the Bag-of-Visual-Words (BoVW) model initially proposed for text categorization has been successfully applied to image classification

[12] The study also revealed that researchers nowadays use more than one algorithm to address a problem. Optimal feature selection has also emerged to be a key thing that researchers are using to optimize the performance of Machine learning algorithms. Python programming languages together with its libraries are the most used tools in creating, training, and testing models. The most used algorithms in addressing both classification and prediction problems are; Naïve Bayes, Support Vector Machine, Random Forest, Artificial Neural Networks, and Decision Tree. The recurring themes identified in this study are likely to open new frontiers in Machine learning research.

[13] Datasets and algorithms which considered are ISPRS 2D semantic labeling colour, infrared images, RGB satellite imagery, multimedia images convolutional neural network CRF .DBN feature is used in order to classify the scene of the satellite imagery which are identified as mountains or hills stations or any other nature places. Random sample consensus algorithm is used to estimate the homograph between the Google images and ISPRS data. Temporal changes are marked in red color that changes time to time according to the various datasets

[14] Different from the hand-crafted features which are empirically designed but lack high generalization ability, the proposed approach can autonomously extract the data-dependent feature. The presented feature extraction algorithm is composed of two layers, and the bases of these two layers are uniformly learned by a plain K-means clustering algorithm. The proposed feature extraction approach can automatically extract not only simple structure features (e.g., edges) but also complex structure features (e.g., corners and junctions). The learned feature is further discriminated by the linear support vector machine classifier for scene classification. In order to fairly demonstrate the validity of the proposed feature extraction approach, its satellite image scene classification performance is evaluated on the public UCM-21 data set.
[15] Kaggle dataset, which contains 45000 plus images, dataset has images of different dimensions. For training the model, split the dataset into a training ,testing and validation . Therefore, all noisy and corrupted data points must be removed from the dataset. Pandas is a Python library used for working with data sets.It has functions for analyzing, cleaning, exploring, and manipulating data. Albumentations is a Python library for image augmentation

IV. CONCLUSIONS

Through this literature survey it is evident there has been lot of work done on classification of satellite images. Most of the existing systems used Machine learning techniques such as Random Forest, RNN and CNN for the purpose of classification. Most of the existing system tried to classify Images based on features into different classes as per the label in the dataset. This motivated to use LBP, Feature Extraction Method and CNN for classification CNN prove to be more efficient than other algorithms.The Literature survey also helped us to learn that there is enough scope for a system that classifies the used and unused landscape in satellite images

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