



## IMAGE CLASSIFICATION METHOD BASED ON SATELLITE USING MACHINE LEARNING ALGORITHM

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### ABSTRACT

Satellite images in course of capturing and transmitting me frequently degraded due to images effects or uncertain conditions. These effects introduce different anise patterns such as, Additive White Gaussian Noise, Salt & Pepper Noise and Mixed Noise. Therefore, retrieved images are highly noise corrupted because the image contents are more attenuated or amplified. The selection of optimum Image Processing and filtering technique depends to have knowledge about the characteristics of degrading system and noise pattern in an image. In this paper, Machine learning model used with components Support vector machine (SVM) Classifier and Extended Local Binary Patterns (ELBP) is used for Image Processing from highly noise corrupted images. The implementation of proposed methodology is being carried out by estimating the noise patterns of wireless image through configuring System Identification with SVM Classifier. Then, these estimated noise patterns are eliminated by configuring Signal Processing with SVM algorithm. The Processing of satellite images are done on basis new proposed ELBP Processing techniques. The method used in this work is ELBP-SVM and the Satellite image correct recognition obtain is 94%.

**Keywords:**Extended Local Binary Patterns, LDA, PSNR, AWGN, PCA, Support Vector Machine.

### INTRODUCTION

In satellite picture handling, a channel is a gadget or cycle that eliminates from a satellite picture some undesirable segment

or highlight. Nonetheless, channels don't solely act in the recurrence area; particularly in the field of picture preparing numerous different focuses for separating exist.



Relationships can be taken out for certain recurrence parts and nobody else without acting in the recurrence area. The disadvantage of separating is the loss of data related to it. The satellite picture blend in Fourier space is an elective methodology for the expulsion of specific frequencies from the recorded satellite picture. There are a wide range of bases of ordering channels and these cover from numerous points of

view; there is no straightforward various levelled arrangement. After doing bunches of abstract works in the connected regions for a choice of proposed work. After experiencing writing from books, research papers, and standard sites in this work it is observed that accessible techniques are adequate however with some impediment in regards to the speed of complete (Classification time).

## LITERATURE REVIEW

S. No	Journal Type with year	Authors	Title	Outcomes
1	International Conference on Machine Learning, 2019	A.Asokan, J.Anitha	Machine Learning-based Image Processing Techniques for Satellite Image Analysis	Machine Learning, image segmentation, image fusion techniques
2	Advancement in Engineering Technology Advances in Science, Technology and Engineering Systems Journal	Sehla Loussaief, Afef Abdelkerim	Machine Learning framework for image classification	Machine Learning, image segmentation, image fusion techniques
3	International Journal of Engineering Research and Technology	MohdAzlan Abu, NurulHazirah Indra, Abdul Halim Abd Rahman	A study on Image Classification based on Deep Learning and Tensorflow	About Deep neural network, MobileNet, Convolution process



4	arXiv:1711.05862v1[cs.CV] 3 Nov 2017.	Andreas Kolsch, Muhammad ZeshanAfzal	Real-Time Document Image Classification using Deep CNN and Extreme Learning Machines	About Deep Neural Network, Extreme Learning Machines, Single Feedforward Network
5	978-1-5386-4615-1/18/2018 IEEE.	BasselMarhaba, MouradZribi	The bootstrap Kernel Diffeomorphism Filter for Satellite Image Classification	Bootstrap kernel diffeomorphism filter, EKF, ISNR, PSNR, Histogram

## EXISTING METHOD

The (random forest) algorithm establishes the outcome based on the predictions of the decision trees. It predicts by taking the average or mean of the output from various trees. Increasing the number of trees increases the precision of the outcome. A random forest eradicates the limitations of a decision tree algorithm. It reduces the overfitting of datasets and increases precision. It generates predictions without requiring many configurations in packages.

## DISADVANTAGES

1. Complexity.
2. Longer Training Period.
3. Suffers interpretability and fails to determine the significance of each variable.

4. Misclassification happens in random forest
5. Computation cost is high.

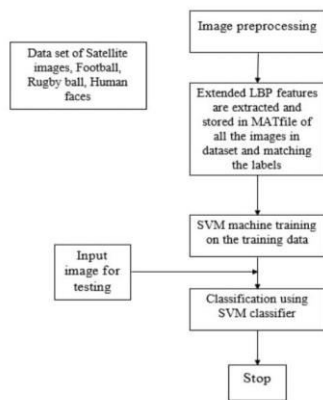
## PROPOSED METHOD

*Local Binary Pattern (LBP)* is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic gray-scale

changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyze images in challenging real-time settings.

*Support Vector Machine (SVM)* is a supervised machine learning algorithm that can be used for both classification and regression challenges. However, it is mostly used in classification problems. In the SVM algorithm, we plot each data item as a point in n-dimensional space (where n is a number of features you have) with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiates the two classes very well.

## METHOD USED IN THE PROJECT



**Fig.1:**Flow process of the method

Figure 1 underneath shows the stream cycle of the strategy embraced for this work. here this work has taken four diverse class of pictures and train the framework with highlights of those pictures. Highlights of those preparation pictures are Extended Local Binary Patterns (ELBP) and Linear Kernel base Support Vector Machine (LKSVM) and Radial Kernel-based Support Vector Machine(RKSVM). This work utilizes at least five preparing pictures for one class. Next is the choice of the test picture the test picture can be some other picture, however, it must be unique concerning preparing pictures. At that point highlights of the test picture extricated as was separated from preparing pictures. presently think about the ELBP highlights, LKSVM highlights, and RKSVM highlights. the characterization choice depends on ELBP and anyone among LKSVM and RKSVM.

### (a) ELBP Algorithm:

Officially, given a pixel at  $(x_c, y_c)$ , the subsequent LBP can be communicated in decimal structure as:

$$LBP_{P,R}(x_c, y_c) = \sum_{p=0}^{P-1} (i_p - i_c) 2^p \dots (1)$$

where  $i_c$  and  $i_p$  are separately dim level estimations of the focal pixel and P encompassing pixels in the hover neighborhood with a span R, and capacity  $s(x)$  is characterized as:

$$s(x) = \begin{cases} 1 & x \geq 0 \\ 0 & x < 0 \end{cases} \dots (2)$$

To eliminate turn impact, a pivot invariant LBP is proposed:

$$LBP_{P,R}^r = \min\{ROR(LBP_{P,R}, i) \mid i = 0, 1, \dots, P-1\} \dots (3)$$

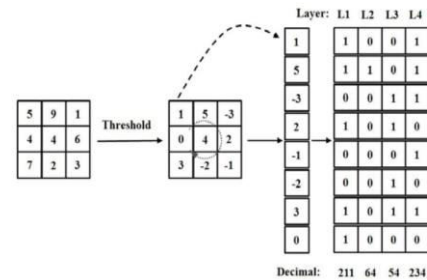
where  $ROR(x, 1)$  plays out a roundabout piece insightful right move on the P-bit number x I times. the  $LBP_{P,R}$  administrator measures event insights of individual turn invariant examples comparing to certain miniature highlights in the picture.

ELBP is touchy to clamor since the administrator limits precisely at the estimation of the focal pixel. To address this issue, stretched out the first LBP to a form with 3-esteem codes, called Local Ternary Patterns (LTP). In LTP, marker  $s(x)$  in (1) is supplanted by:

$$s(i_n, i_c, t) = \begin{cases} 1 & i_n \geq i_c + t \\ 0 & |i_n - i_c| < t \\ -1 & i_n \leq i_c - t \end{cases} \dots (4)$$

where t is a client determined limit. A coding plan is utilized to part ternary

example into two sections: the positive one and negative one, as shown in Figure 2.



**Fig.2:**An example of the ELBP operator

### (b) Support Vector Machine:

The SVM calculation is executed by and by utilizing a part. The learning of the hyperplane in straight SVM is finished by changing the issue utilizing some direct polynomial math, which is out of the extent of this prologue to SVM. For instance, the inward result of the vectors is  $2*5 + 3*6$  or 28. The condition for making an expectation for another info utilizing the spot item. between the information (x) and each help vector ( $x_i$ ) is. determined as follows:

$$f(x) = B_0 + \sum_{i=1}^N (a_i x + a_i x_i) \dots (5)$$

This work uses a complex radial kernel.

$$K(x, x_i) = e^{-\gamma(\sum_{i=0}^N (x-x_i)^2)} \dots (6)$$

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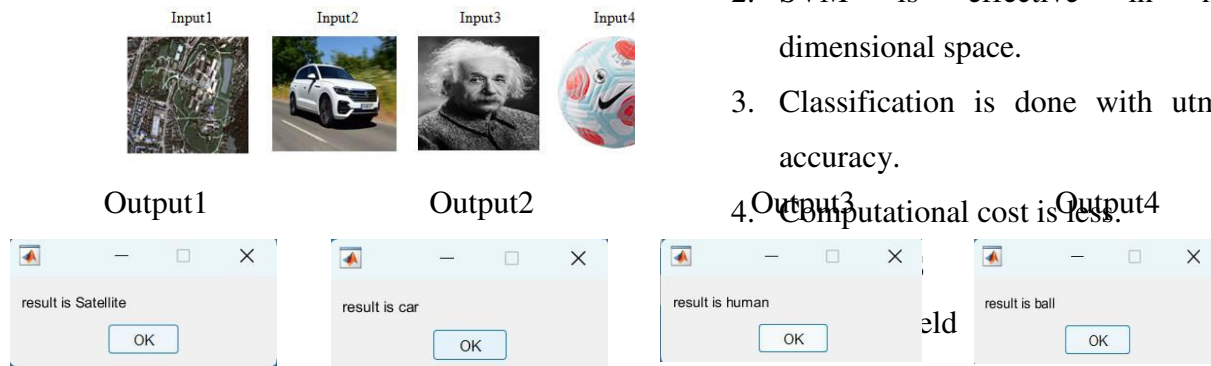
### RESULT

*Data Train:*

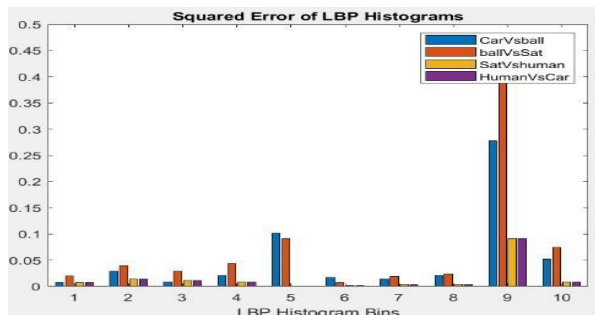


*Inputs and Outputs:*

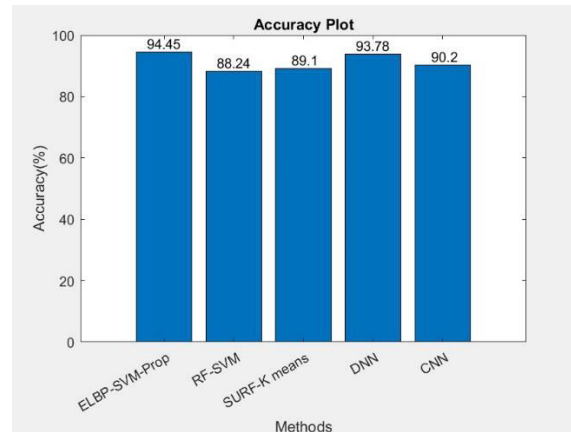
If we give input as Satellite Image, then output will be displayed as “result is Satellite”. Similarly, if we give inputs as car, human, ball we will get output as follows.



*SVM Classify:*



*Performance Evaluation:*



So, by using ELBP-SVM method, we get accuracy approximately 94% as compared to other methods as shown in Accuracy plot.

### ADVANTAGES

1. SVM works well with a clear margin of separation.
2. SVM is effective in high dimensional space.
3. Classification is done with utmost accuracy.
4. Computational cost is less.

2. Medical Field
3. Research and Development sector
4. Agriculture land

### CONCLUSION

This paperwork relates the technique and algorithms used in the proposed machine learning framework for satellite image



classification. Paper introduced AI cutting edge applied to picture order. This work presented the Bag of Features worldview utilized for input picture encoding and featured the Extended Local Binary Pattern as its strategy for picture features extraction. Through experimentations, this work sealed that utilizing ELBP different channel component extractor technique for picture preparing classifier performs the best expectation of normal precision. In test situations, this zeroed in on satellite pictures as this work task is to apply the prepared classifier in an overall framework.

## **FUTURE SCOPE**

As of now, even though a wide scope of strategies is accessible for picture preparation, it is very lumbering to show up at a strategy which can be ordinarily applied to a wide range of satellite pictures attributable to the distinctive tone and textural varieties. Thus, as of now, the specialists are attempting to show up at certain arrangements by consolidating different picture preparing strategies or presenting crossbreed models dependent on phantom and spatial lists for the equivalent to improve the result.

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