

## Image Segmentation and Empirical Evaluation of image enhancing with SLIC using hybrid feature descriptor HOG and LBP

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### ABSTRACT

IN this proposed paper, in the initialization stage, a super pixel based initial segmentation is applied to the original image. After that, the original image will be divided into a certain number of super pixels. Then, each super pixel will be represented by a novel super pixel feature based on color histogram over Hue plane. The color parameter has increased the overall accuracy of the system.

However, we introduce a novel algorithm called SLIC (Simple Linear Iterative Clustering) that clusters pixels. In this paper, we apply super pixel like clustering SLIC as the initial segmentation at the beginning. After the first stage, original image is divided into a desired number of size-equal super pixels. Then, the remaining task is to classify by object and background label. Moreover, for the purpose to represent each super pixel, the feature extraction of super pixel is necessary. Hence Experiments show that our approach produces super pixels at a lower computational cost while achieving a segmentation quality equal to or greater than four state-of-the-art methods, as measured by boundary recall and under-segmentation error. We combined here LBP with HOG to generate uniform pixels with low computational cost and increased average accuracy.

**Keyword:** *SLIC (Simple Linear iterative Clustering); LBP(Local Binary pattern); HOG( histogram of oriented gradients).*

### INTRODUCTION

It is a strategy to change over an image into digital shape and play out specific exercises on it, in order to get an overhauled image or to remove some important information from it. An image is a two-dimensional limit  $f(l, m)$ , where  $l$  and  $m$  are the spatial (plane) composes, and the adequacy of at any pair of bearings  $(l, m)$  is known as the intensity of the image at that level.

### Image Restoration

Picture Restoration is the operation of taking a degenerate/loud picture and evaluating the spotless, unique picture. Defilement may come in numerous structures, for example, movement obscure, commotion and camera miss-centre. Picture rebuilding is performed by adopting the process of masking the picture and it is done by imaging a point source and utilizing the point source picture, which is known as the Point Spread Function (PSF) so as to retrieve the lost data by masking.

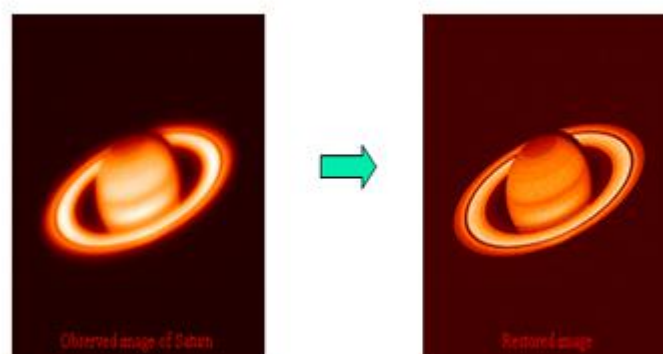


Fig. 1 Image Restoration

### Content Based Image Retrieval

CBIR Content-based image retrieval summarizes the content and made request to review the substance of the image instead of the metadata. For request they watch marks, words, or interpretations related with the image. The expression content in this setting may imply shapes, shades, surfaces, or may be some other information

that can be taken from the image itself. CBIR remark quality and satisfaction that is determined basically by metadata.

**Image Segmentation:** Image segmentation is a procedure of fragmenting a digital image into group of pixels called super-pixels. These pixels are further simplified and any change is represented as some easier and useful information by finding objects and boundaries made by different tools like curves and lines etc.

#### **Simple Linear Iterative Clustering (SLIC)**

Super pixels are winding up progressively well known for use in Personal Computer Vision applications. Moreover, these may carry couples of calculations that return a desired number of customary, reduced super pixels having low computational overhead. These new calculation called SLIC (Simple Linear Iterative Clustering) are grouped pixels which are joined to have five-dimensional shading and picture plane space. By productively reducing, almost uniform super pixels were obtained whose Analyses can demonstrate that SLIC creates super pixels at a lower computational cost. By accomplishing a division quality equivalent to or more prominent than four best in class strategies, as estimated by limit review and under-division blunder.

#### **Gray Level Co-Occurrence Matrix: (GLCM)**

It is nothing but a matrix which is referred to as a co-occurrence distribution, represents the distance and angular spatial relationship over an image sub-region of specific region of specific size.

#### **HOG Features**

HOG descriptors carry features such as human detection that can compute by counting the frequencies of incline alignment in localized portions of an image. HOG structures can be depicted by the distribution of intensity inclines that are based on the existence and shape of the facial features.

#### **LBP Features**

LBP features are most capable of extracting textual features that are widely accepted for image representation and the image shape is recovered by adding of different local histograms. The most important properties of LBP are its simple computations and radiance invariance.

#### **Gabor Features**

In image processing Gabor filters are very popular and widely used in texture analysis as they show outstanding properties like optimal joint spatial/ spatial frequency localization. They have the ability to simulate the accessible fields of simple cells in the visual cortex [19].

#### **RELATED WORKS**

**Naushad et al.** [1] presented, the visual substance of the photographs which must be cleared utilizing piece level Discrete Cosine Transformation and Gray Level Co-event Matrix. Since the DC coefficients based portion vector has held the most indispensable visual bits of the image, so from the start, they have arranged ABD. **Rasid Mamat et al.** [2] Most of Content Based Image Retrieval (CBIR) system use overall surface features for addressing and recouping pictures. If close by surface features are ignored during the hidden period of picture setting up, the introduction will be impacted. Meanwhile the features extraction, if it relies upon Color co-occasion Matrix (CCM) will give the open entryways convincing CBIR.

**Metty Mustikasari et al.** [3] proposed an approach to manage recoup pictures subject to surface features using GLCM and picture sub-squares. Surface features are isolated subject to GLCM (Gray Level Co-occasion Matrix) using four accurate features that is separate, homogeneity, imperativeness and association.

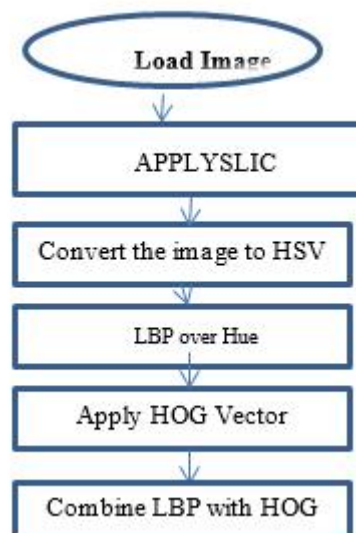
**D.Lopez Peria et.al** [4], presented paper to enhance human shape orientations, without unambiguously or actually calculating such shapes, but using its information as the own gradient magnitude. Firstly they thought to explore by using appearance evidence, which are very useful in finding object and has been widely demonstrated, where they can mix cues with the HOG descriptor, e.g., color HOG, co-occurrence HOG, etc. The another source is the intensifying development of using segmentation for both detection and segmentation. Segmentation is basically done for pixel-based object detection, that can help in detecting outputs based on shape and thereby generating candidate windows. Hog descriptors are also used to exploit global image segmentation.

Chi-Yu-His et al. [5] proposed a reasonable graph based picture division using super pixel-based outline depiction is displayed. With SLIC super pixels, the primary picture division issue is changed into the super pixel checking issue. It makes the proposed figuring more compelling than pixel-based division counts and other super pixel-based division methodologies. These methodologies make the division result continuously unflinching with human acknowledgment. The diversions on Berkeley division database show that our proposed system beats top tier strategies.

P.Chandana et.al [6] In the present current advancement provoked a faster improvement of mechanized media collection, and it contains both still pictures and accounts. Limit contraptions contain tremendous proportion of electronic pictures, extending the response time of a structure to recoup pictures required from such groupings, which degrades the display.

### Proposed Algorithm

- Input Images are taken. We are using Corel-1K dataset for it and taken only Dogs and Cats images for experiment. Applying SLIC for obtaining 16 segments.
- Transforming the original image to HSV image and applying LBP over Hue plane.
- Applying HOG vector over 8x8 block to generate residual image.
- Finally concatenate the original HOG vector with SLIC vector to generate our feature vectors.



*Flow chart of Proposed System*

In order to explain pure local binary pattern in a texture, strong Local Binary Pattern is utilized where inception surrounding pixel values are evaluated and multiplied by binomial values of the surrounding pixels. LBP, is a technique which is a gray scale invariant and are very easy to mix by a simple contrast measures. Their value can be easily computed for each surrounding pixel by differencing the mean gray level of these pixels having values 1 and 0.

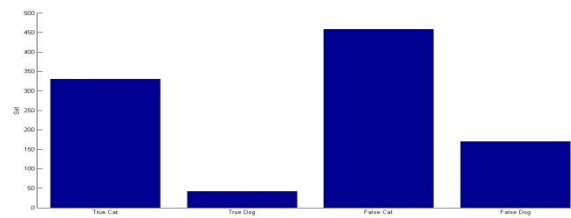
### Description of Performance Parameters

In the proposed System, we calculated the below listed parameters to analyze the accuracy of the system.

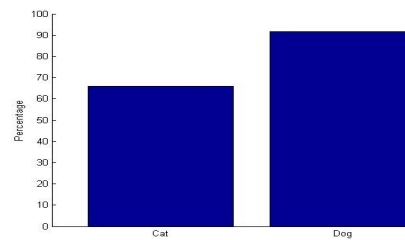
- True Positive Rate or Recall Rate
- False Positive Rate or Fall out Rate
- True Negative Rate or Specificity
- False Negative Rate or Precision

### EXPERIMENTAL RESULTS

In our study, we used corel set of images of animals particularly dogs and cats. We proposed the improvement over an existing CBIR system by segmenting image into super pixel by using SLIC and then by producing vectors Hsv and by using LBP over Hue plane.



**Fig. 10 True Positive(TP), True Negative(TN), False Positive(FP) and False Negative(FN)**



**Fig. 11 Average Accuracy of System**

## CONCLUSION

In this research work we segmented image into regions and then applied LBP over hue plane to convert image into 8X8 segments and then applied Hog vector. We concluded that the results of proposed work has better efficiency then previous with GLCM and LBP. From results it is clear that recall rate is increased by 9.9% and precision improved by 9%.

In this experiment we've proposed an improvement over an existing CBIR by introducing LBP pattern combined with HOG vector. The considered system has added colour parameter which has increased the overall accuracy of the system.

## REFERENCE

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