

# An Insight on Image Segmentation by Using Pre-image Processing

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## Abstract:

Digital images are present everywhere in the Internet. Hence, the Internet has become a very important source of information and offers all the ways to inter change the information. Segmentation is a process in which an object or a part of image is analysed and recognized the pattern in the initial step of processing the image segmentation. These segments of an object are grouped on the basis of classical gestalt cues which include texture, contrast, etc. Image segmentation is all about the analysis and judging the function in image processing. Image segmentation refers is a process of splitting of an image into different regions that are of homogeneous in nature. During the process of an image, image is segmented into small modules by using image processing algorithm. Using different types of image processing algorithm the image segmentation can be viewed by the user to process the image to do the need full.

*Keywords* — **Classification Image, over segmented Pixels, Pre-processing, Segmentation**

## 1. INTRODUCTION

The basic idea behind the digital image processing refers to processing of digital image, i.e. removing the unwanted data and sharpening the digital image in the digital computer. Various method are been used in developing in Image Processing over last few decades. It used to identify the regions of interest in a given data. We categorize the existing segmentation algorithm into region-based segmentation, data clustering, and edge-base segmentation.

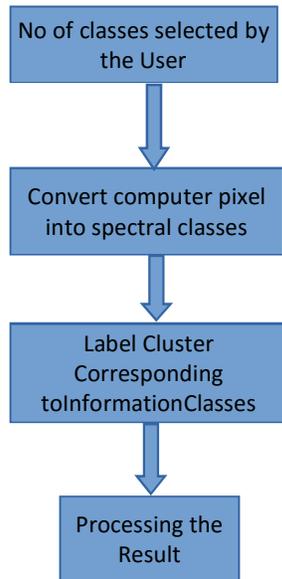
## 2 Image Classification

Image classification refers to the task of removing information classes from a multiband raster image.

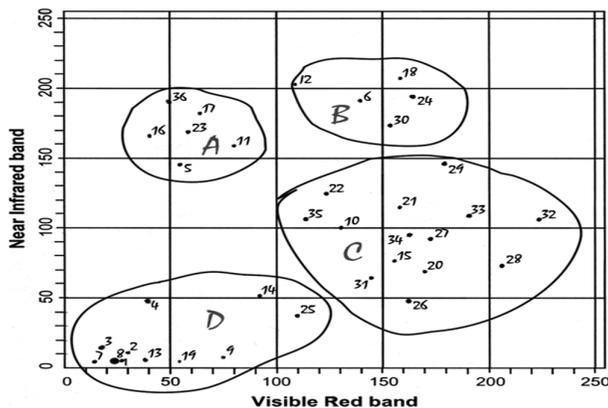
### 2.1 Unsupervised Classification

In unsupervised classification, it primarily classifies the pixels into clusters based on their properties. In order to create clusters, analysts use image clustering algorithms such as K-means and fuzzy c-means. After selecting suitable clustering algorithm, we identify the number of classifications that wanted to generate. For example, you can create 4, 8, 20 clusters. These are unclassified clusters because in the next step, we manually find out each cluster with the classes. In the figure 1.0 represent the unsupervised classification

Overall, unsupervised classification is the most basic technique. Because we don't required samples for unsupervised classification, it is very simple to segment and understand an image.



In most of the cases, the probability density function is selected to be a multiple normal distribution. The multiple normal distributions give the following maximum likelihood estimator[1] Fig 1.0(below)



$$\text{Mean ; } \mu_{ei} = \frac{1}{n} \sum_{j=1}^n X_{ij} \quad (i = 1, 2, \dots, m)$$

Variance - covariance matrix

$$\Sigma_e = \frac{1}{m} \sum_{i=1}^m (X_i - \mu_e) (X_i - \mu_e)$$

where m: number of bands  
n: number of pixels

Fig 2. 2

## Supervised Classification

In supervised classification, we select typical of a class samples for each land cover class. The software then uses these training sites and applies them to the entire image.

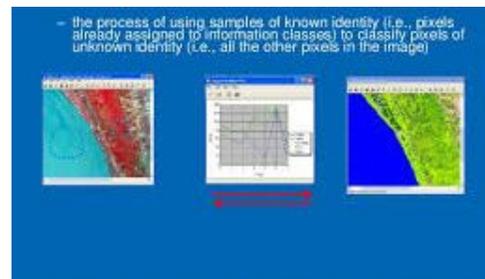
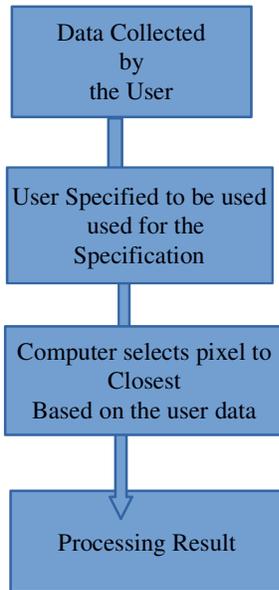


Figure 2.0

In the above figure 2.0 represents supervised classification. Supervised classification uses the spectral signature defined in the training set. For example, it occurs in each class on what it has similar appearance most in the training set. The common supervised classification algorithms are maximum state and minimum-distance classification.

Any range of wavelengths of the digital image can be plotted and compared. Such plots are called spectral response curves or spectral signatures.

### Supervised Classification



### 3. Object-Based (or Object-Oriented) Image Analysis Classification

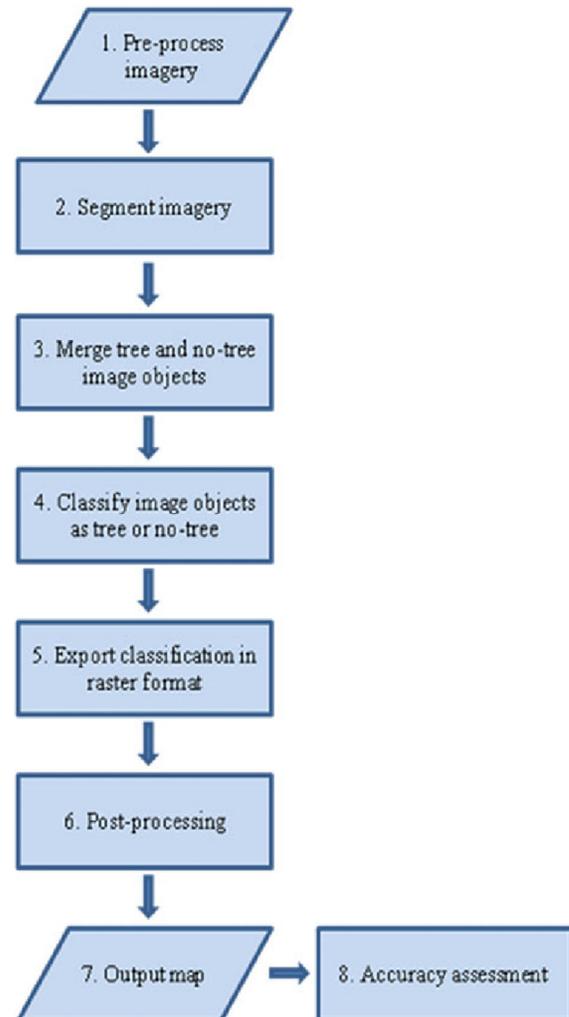
Supervised and unsupervised types are a pixel-based. In other words, it creates square pixels and each pixel has a class. But object-based image classification groups pixels into representative shapes and sizes. This process is multi-resolution segmentation or segment mean shift.

Multi-resolution segmentation produces homogenous image objects by grouping pixels. It generates objects with different scales in an image simultaneously. These objects are more meaningful because they represent features in the image.

**4. Image preprocessing:** It is a common thing which is used to operate the image in a low level of input and output intensity of an image. The main purpose of pre image processing is to improve the image features for processing the data[1].

Digital images obtained from many source like media, digital cameras, etc., it may lack in contrast

and brightness because of the limitations of imaging sub systems and conditions while capturing image. Images may have different types of distortion. Image preprocessing also helps in image enhancement [1]. To improve the quality of the image, it include contrast and edge



Unsupervised classification.

enhancement, pseudo-coloring, sharpening, noise filtering and magnifying. Image improvement is useful in feature extraction, image analysis and an image display. Some of the image enhancement techniques are:

- a. Contrast Stretching
- b. Noise Filtering

c. Histogram modification

#### 4.1. Contrast Stretching:

It is a simple image action of method that helps to improve the contrast in an image by stretching the range of intensity values it contains to span a desired range of values. Before the image is stretched it is mandatory to specify the starting and last pixel value limits over which the image is to be normalized. For example for 4-bit gray level images the lower and upper limits might be 0 and 255. Call the lower and the upper limits  $c$  and  $d$  respectively.

#### 4. 2 Linear contrast

Linear contrast is also known as contrast stretching, In contrast stretching digital image values are distributed equally into new position. By spreading out the original values of the image, the total space in the display device can be utilized to a maximum extent.

##### 4.2.1 Min-Max Linear Contrast Stretch

##### 4.2.2 Percentage Linear Contrast Stretch

#### 4.3 Noise Filtering:

Noise reduction is the process of removing unwanted data from a signal. Different types of filters are used to remove the unwanted signals[1]. In the figure 3.0 tells the noise filtering.

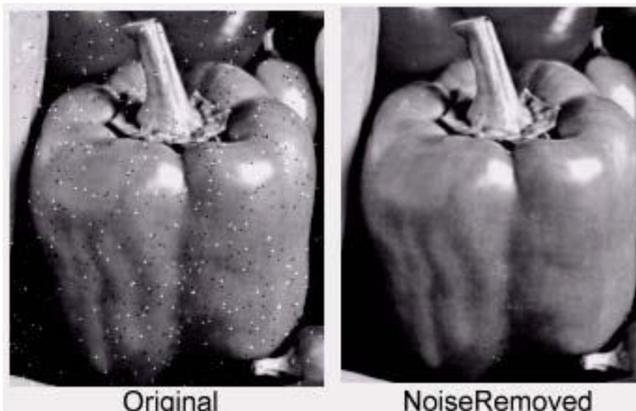


Figure 3.0

#### 4.4 Histogram Modification

Histogram places a very in image enhancement without stretching the actual image. It snacks the feature of image. By changing the histogram, image feature can be changed.

Histogram, it redistributes the pixel value with the approximate of the same numbers of pixel using nonlinear stretch. Hence forth the contrast of the image is increased at the highest.

#### 5. Image segmentation:

Image segmentation is used in many fields of image processing. It can detect the regions of a scene in an image or description of the data. We can characteristics the image segmentation algorithm into **threshold, data clustering, and edge-base** segmentation.[4] In data clustering, the concept is based on the entire picture and based on the distance between individual elements. The clustering characteristic of the information in the pixel are not likely connected. In data clustering, basic idea is to divide the data into segment and hierarchical clustering. Furthermore, we show the part of data clustering called mean shift algorithm, although this algorithm much belonging to density estimation. The last category of segmentation is edge-based segmentation. This type of the segmentations generally comes up with the concept of edge or edge detection [2].

#### 5.1 Threshold Method:

Thresholding Method is the simplest methods among the all the methods in image segmentation. [5] These methods divide the pixels of an image with respect to their intensity level. These methods are used over images having lighter objects when compared to the background. The selection of these methods can be done either in manual or automatic i.e. can be based on prior knowledge or information of image features. There are basically three types of thresholding Global Thresholding: This is done by using any appropriate threshold value/ $T$ . This value of  $T$  will

be constant for whole image. On the basis of T the output image can be obtained from original image. Variable Thresholding: In this type of thresholding, the value of T can vary over the image. This can further be of two types: *Local Threshold*: In this the value of T depends upon the neighbourhood of x and y. *Adaptive Threshold*: The value of T is a function of x and y. *Multiple*

## **5.2. Edge detection:**

The filters are used in order to indicate the discontinuous image by locating the sharp edges. These discontinuities bring difference in pixels intensities which define the boundaries of the object. The object is shark fish and a new methodology is applied to identify the shark type using its morphological features. Here, it is applied for different 2D filters, comparative studies and displays the result. In this edge detection method the assumption edges are the pixels with a high gradient. A fast rate of change of intensity at some direction is given by the angle of the gradient vector is Observed at edge pixels[6].

## **References:**

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*Thresholding*: In this type of thresholding, there are multiple threshold values like T<sub>0</sub> and T<sub>1</sub>. By using these output image can be computed as: the values of thresholds can be computed with the help of the peaks of the image histograms. Simple algorithms can also be generated to compute these. [3].

## **6 .Conclusion:**

In this article, we have discussed about the different types of image preprocessing like Contrast Stretching, Noise Filtering and Histogram modification. Image preprocessing is used in many areas of image processing. The various method of Image segmentation are discussed in this article for various application, the different type of segmentation method can be applied based on their requirement. The fast scanning algorithm is preferred in many places because they are better and fast performance.

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