Identifying Tree Crowns from an Aerial Image

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ABSTRACT

This Paper presents a review of finding a tree crowns from a Satellite image and this is an Application for image processing. They are some modules to find out the tree crowns and different approaches to implement. Histogram Equalization (HE) is the one of the simple and effective techniques to enhancing the image quality. Segmentation plays a vital role to detect the objects, boundaries and other relevant data in the digital images. Watershed is the main Algorithm to find out the markers, which defines some spatial domain required for the satellite image.
Keywords: Histogram Equalization, Thresholding, Edge Detection, CLAHE, Hough Corner Detection.

I. INTRODUCTION

Image Processing is the processing of image and takes image as an input, the output of the image processing may be either an image or set of characteristics. An Image is defined by the mathematical function f(x,y) where x and y are the two co-ordinates horizontally and vertically. Image Processing is used in many applications, like gray scale modifications, earth sciences, remote sensing and finger print identification.

This is includes three steps and they are as follows:

1. Importing the image with optical scanner or by digital photography.
2. Analysing and manipulating the image, which includes data compression and image enhancement.
3. Output is the last stage in which the result can be altered image or report that is based on image analysis.

This Method demonstrates four types of modules to define Tree Crowns Individually and they are as follows:

- Image Enhancement
- Image Segmentation
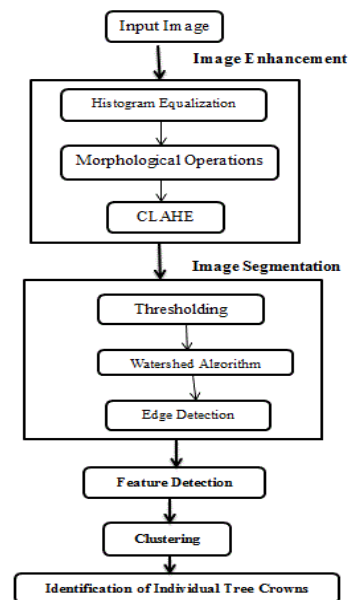- Feature Detection
- Clustering

Figure 1: Overview of finding Tree Crowns

II. METHODS AND MATERIAL

A. Image Enhancement

The Aim of Image Enhancement is to provide interpretability and to provide a better input for automated image processing techniques.

There are several algorithms related to Image enhancement that are as follows:

1. Morphological Operations

This is a collection of non-linear operations related to the shape of features in an image. They process objects in the input image based on the characteristics of its shape. *Erosion* and *Dilation* are the two basic operations. Generally these operations applied to the grey scale images.

In Morphological operations, the value of each pixel of an output image is a comparison of the corresponding pixel in the input image with its neighbours.
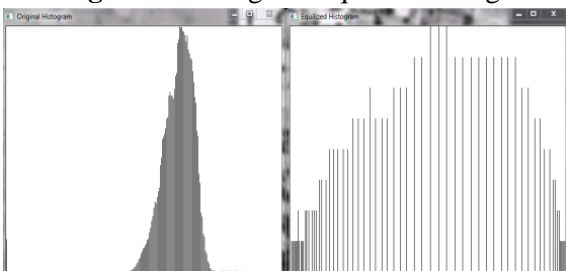

Figure 2: Morphological with Erosion and Dilation operations

2. Histogram Equalization

This is the common technique for the appearance of the images. Histogram is the basically graphical representation of the distribution of data. This is the method in image processing of contrast adjustment using the image's Histogram.
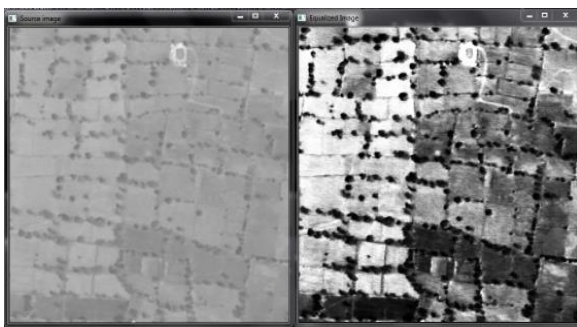
Figure 3: Histogram Equalized Image

Figure 4: Histogram Graphical Data

3. Contrast Limited Adaptive Histogram Equalization (CLAHE)

Contrast of an image is enhanced by applying CLAHE on small data regions called tiles rather than on an entire image. AHE is a computer image processing technique used to improve contrast in images.


Figure 5: CLAHE

B. Image Segmentation

This is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simply and/or change the representation of an image into something that is more meaningful and easier to analyse.

There are several algorithms related to Image Segmentation that are as follows:

1. Thresholding

This method is based on clip-level to turn a grey scale image into a binary image. This is also called as balanced histogram thresholding.
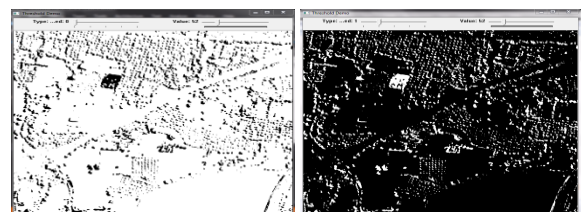

Figure 6: Threshold binary and Threshold Binary Inverted

Figure 7: Truncate and Threshold to zero

2. Watershed Algorithm

Watershed is a transformation on a grey scale image. This Algorithm effectively combines both discontinuity and similarity based methods and computes foreground markers, and these are the connected blobs of pixels within each of the objects in an image.
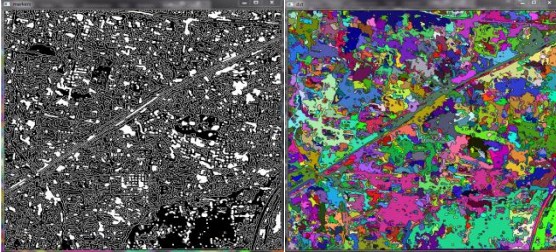

Figure 8: Markers and Watershed Transformations

C. Feature Detection

Feature Extraction is a type of dimensionality reduction that effectively represents interesting parts of an image. When the input data of an algorithm is too large to be processed and it is suspected to be redundant, then it is transformed into reduced set of features.

1. Harris Corner Detection method

This is a Mathematical operator finds features in an image. A corner can be defined as a point for which there are two dominant and different edge directions. This is to find small patches of image (windows) that generate a large variation.
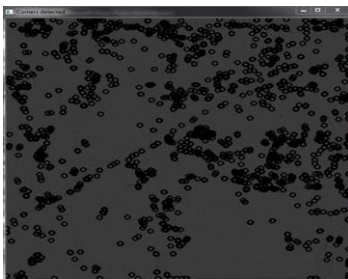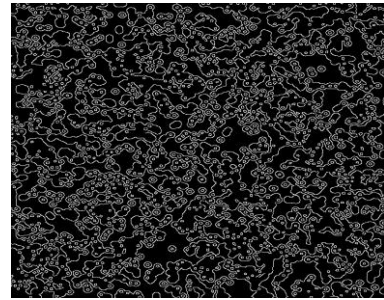

Figure 9: Detection of corners

2. Hough Circle Transform Detection

The Circle Hough Transform (CHT) is a basic technique used to detect objects in an image. The Purpose of this technique is to find circles in imperfect image inputs.

This is to find some Tree Crowns located in the satellite mage.

Figure 10: Identification of Tree Crowns

D. K-Means Clustering

Clustering is a process of partitioning is a group of data points into a small number of clusters. K-Means clustering aims to partition n observations into k clusters, in which each observation belongs to the cluster with the nearest mean, serving as the prototype of the cluster.
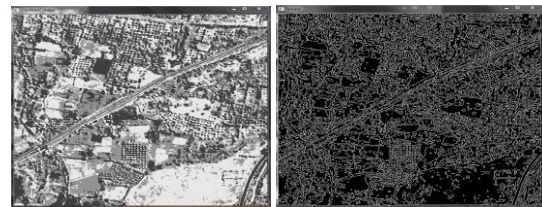
Figure 11 : K-Mean Clustering

III. CONCLUSION

Several Algorithms that provide a variety of approaches for enhancing or modifying the images for a better view. It is not possible to say which technique is good because the image enhanced and feature that had detected by using such technique. The choice of such technique is depend on the requirements.

IV. REFERENCES

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