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Green Path Project Develops Using Image Processing

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Abstract: ***The Green Path project develops Image Processing which includes changing the nature of an image in the order to improve its pictorial information for human interpretation, for autonomous machine perception. In digital image processing, image is converted to an array of small integers, called pixels, representing a physical quantity such as scene radiance, stored in a digital memory, and processed by computer. Interest in digital image processing methods is in two principal applications areas: first one is improvement of pictorial information for human interpretation; and second one is processing of image data for storage, transmission, and representation for image or machine. Edge detection is one of the most difficult tasks in image processing hence it is a problem of fundamental importance in image processing method. In this paper we find out different steps of digital image processing. Like, a high-speed filter implementation is presented. Then Filter solves the purpose of removing the impulse noise from the image and reducing distortion in the image. The Image Processing is very important in the project. Then indicate a specific spot required for pointing to show the main spot for empty places. So, we required to divide the image pixelization points and coloring into different parts. And last one spotted the spot which is very important for project. Image processing is a method to perform operations on an image to extract information from it or enhance it. Digital image processing has a broad range of applications such as image restoration, medical imaging, remote sensing, image segmentation, etc. Every process requires a different technique.***

Keywords: Image Processing, scene radiance

I. INTRODUCTION

"Green Path" provides an easy way to find out the best way for tree plantation. we can see in our daily life the environment is as became as polluted. And also reduces the tree plantation due to find empty places and then tree plant there. This situation is seen in most of Forest side today. From these projects we capture the image of the region and apply various types of concepts of image processing on these images and then spot the region where the area is suitable for tree plantation. Trees are increasingly growth is seen as a solution to both maintain street-level temperatures while improving quality of life. Yet many cities may not have the budget or resources to locate where every tree in town is, or where new tree-planting efforts are most needed.

"With the project, you can see where the empty region, are there where we can plant trees." In today's life style we can see how population is increasing day by day, so there is insufficient facility for increasing human beings. In that situation the main work is done by trees. Trees are very important resources for all living things. So, it is very important to plant the trees. So, using new technology we represent the project, which shows empty places for tree plantation.

Using image processing technology, user input the image or upload the image which capture by GPS, phones, camera, drone, recorded images any type of resources. Then under the image processing, first one edges of images are detected for specify the boundaries of image. In this underline the edges.

Each image is either a grayscale or in a black and white vector. Then after all the applied concepts the last one user see spots where the region is suitable for tree plantation.

II. LITERATURE SURVEY FOR PROBLEM IDENTIFICATION AND SPECIFICATION

With the rapid development of the economy and society, the shortage of energy and the deterioration of environment have become two major problems faced by human beings in today's society. At present, the building industry is the leading source of consumption of world energy sources and various kinds of resources like ores, wood, and so on, as well as the major source of environmental pollution. So, the quantity of green area means trees are reduces day by day.

Through this project we develop a best way to find the empty spaces and grow trees on that place. As per the projects, we find out there are various types of difficulties found in to develop the green path. There is practically difficulty to develop green path.

In last research in 2005, the application develops which is used as map to helps people to find out best route for travelling. Before this, people use paper maps for finding routes. Also, this paper maps are used in military, Army, Navy, and in detectors.

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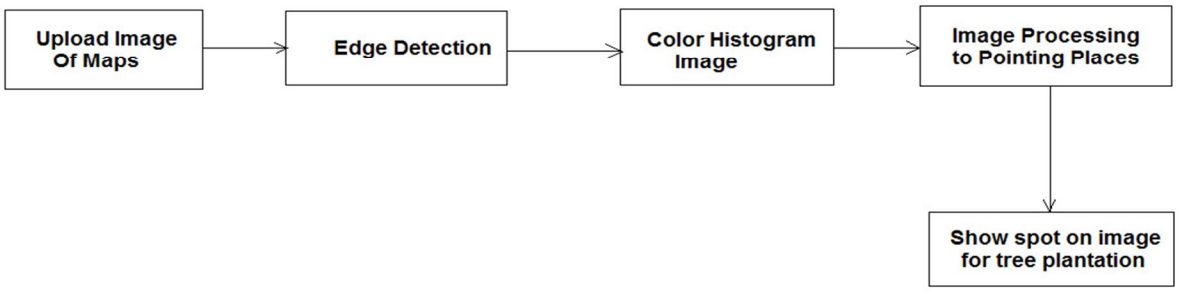
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After longest time, the revolution is going to through the new technology. Then google launched a desktop application as a new solution to help people. The new technology increases day by day and then technology suffer from paper to paperless.
The primary function of this technology is to produce maps that give accurate representations of a particular area, detailing major road arteries and other points of interest. The technology also allows the calculation of distances from one place to another.
With this new technology, we do some specific changes and form a new application which is used to find out best place for tree plantation. By using image processing our project "Green Path" develops a best place for tree plantation.

III. PROBLEM STATEMENT

As we can see in our daily life, the environment is as became as polluted. There are a lot of problems due to polluted environment. And also reduces the tree plantation due to find empty and how plant trees there. From overcome this problem we plan the project Green Path. This situation is seen in most of Forest side today. This project is developed to overcome this problem.

IV. DIAGRAM



V. MODULE DESCRIPTION

A. Upload Image of Maps

The Map module, lets you see where your Images were captured on a Google map. It uses GPS coordinates embedded in your Images metadata to plot the Image on the map. Most mobile phones, including iPhones, record GPS coordinates in metadata. you can add it in the Map module, or import a track log from a GPS device.
You must be able to use the Map module. Maps appear in the language that your default web browser uses, which may be different from the language versions. Before we do any image processing, we need to understand how images work. Specifically, we'll discuss how these files use byte data and pixels to represent images.
If you've ever looked at an image file's properties before, it'll show the dimensions of the image, i.e., the height and width of the image. The height and width are based on number of pixels. For example, if the dimensions of an image are 400x300 (width x height), then the total number of pixels in the image is 120000.
The Image module provides a class with the same name which is used to represent a PIL image. The module also provides a number of factory functions, including functions to load images from files, and to create new images.
PIL is the Python Imaging Library which provides the python interpreter with image editing capabilities. It was developed by Fredrik Lundh and several other contributors. Pillow is the echo-friendly PIL fork and an easy-to-use library developed by Alex Clark and other contributors. We'll be working with Pillow.

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B. Edge Detection

Edge detection is an image-processing technique, which is used to identify the boundaries (edges) of objects, or regions within an image. Edges are among the most important features associated with images. We come to know of the underlying structure of an image through its edges. Computer vision processing pipelines therefore extensively use edge detection in applications.

When it comes to image classification, the human eye has the incredible ability to process an image in a couple of milliseconds, and to determine what it is about (label). It is so amazing that it can do it whether it is a drawing or a picture. The idea today is to build an algorithm that can sketch the edges of any object present on a picture, using the Canny edge detection algorithm.

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. It was developed by John F. Canny in 1986. Canny also produced a computational theory of edge detection explaining why the technique works. One last important thing to mention, is that the algorithm is based on grayscale pictures. Therefore, the pre-requisite is to convert the image to grayscale before following the above-mentioned steps.

The Canny edge detection algorithm is composed of 5 steps:

1) Noise Reduction

Since the mathematics involved behind the scene are mainly based on derivatives (cf. Step 2: Gradient calculation), edge detection results are highly sensitive to image noise.

One way to get rid of the noise on the image, is by applying Gaussian blur to smooth it. To do so, image convolution technique is applied with a Gaussian Kernel (3x3, 5x5, 7x7 etc…). The kernel size depends on the expected blurring effect. Basically, the smallest the kernel, the less visible is the blur. In our example, we will use a 5 by 5 Gaussian kernel.

The equation for a Gaussian filter kernel of size (2k+1) × (2k+1) is given by:

$$H_{ij} = \frac{1}{2\pi\sigma^2} \exp\left(-\frac{(i-(k+1))^2 + (j-(k+1))^2}{2\sigma^2}\right); 1 \leq i, j \leq (2k+1)$$

Gaussian filter kernel equation

2) Gradient Calculation

The Gradient calculation step detects the edge intensity and direction by calculating the gradient of the image using edge detection operators. Edges correspond to a change of pixels' intensity. To detect it, the easiest way is to apply filters that highlight this intensity change in both directions: horizontal (x) and vertical (y).

When the image is smoothed, the derivatives Ix and Iy w.r.t. x and y are calculated. It can be implemented by convolving I with Sobel kernels Kx and Ky, respectively:

$$K_x = \begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix}, K_y = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}.$$

Sobel filters for both direction (horizontal and vertical)

Then, the magnitude $\boldsymbol{G}$ and the slope $\boldsymbol{\theta}$ of the gradient are calculated as follow:

$$|G| = \sqrt{I_x^2 + I_y^2},$$
$$\theta(x, y) = arctan\left(\frac{I_y}{I_x}\right)$$

Gradient intensity and Edge direction:

3) Non-maximum Suppression

Ideally, the final image should have thin edges. Thus, we must perform non-maximum suppression to thin out the edges. The principle is simple: the algorithm goes through all the points on the gradient intensity matrix and finds the pixels with the maximum value in the edge directions.

The edge direction is the orange dotted line (horizontal from left to right). The purpose of the algorithm is to check if the pixels on the same direction are more or less intense than the ones being processed. In this case the direction is the orange dotted diagonal line. The result is the same image with thinner edges.

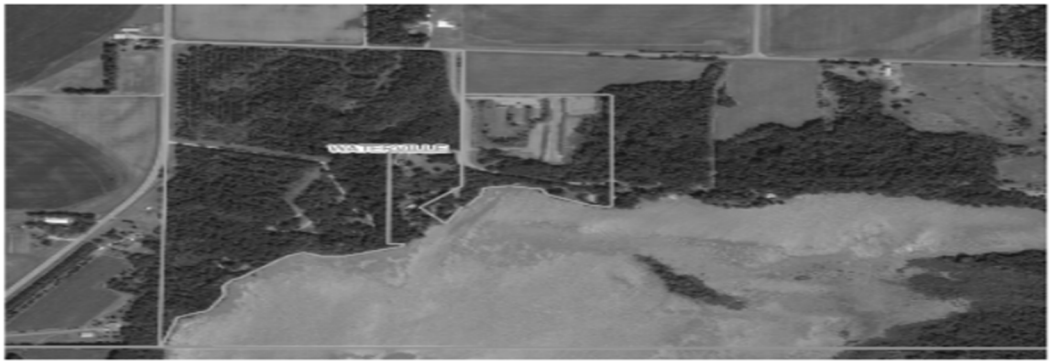
4) Double Threshold

Now you can see what the double thresholds holds for:

- High threshold is used to identify the strong pixels (intensity higher than the high threshold)
- Low threshold is used to identify the non-relevant pixels (intensity lower than the low threshold)
- All pixels having intensity between both thresholds are flagged as weak and the Hysteresis mechanism (next step) will help us identify the ones that could be considered as strong and the ones that are considered as non-relevant.

5) Edge Tracking by Hysteresis

Based on the threshold results, the hysteresis consists of transforming weak pixels into strong ones, if and only if at least one of the pixels around the one being processed is a strong one.



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C. Color Histogram Image

In image processing a color histogram is a representation of the distribution of colors in an image. For digital images, a color histogram represents the number of pixels that have colors in each of a fixed list of color ranges, that span the image's color space, the set of all possible colors.

The color histogram can be built for any kind of color space, although the term is more often used for three-dimensional spaces. For monochromatic images, the term intensity histogram may be used instead. For multi-spectral images, where each pixel is represented by an arbitrary number of measurements the color histogram with N being the number of measurements taken. Each measurement has its own wavelength range of the light spectrum, some of which may be outside the visible spectrum.

Now, we visualize colors in an image using histogram. An image consists of various colors and we know that any color is a combination of Red, Green, Blue. So, Image consists of red, green, blue colors. So, using Histogram we can visualize how much proportion we are having RGB colors in a picture. Histogram actually provides how frequently various colors occur in an image but not the location of color in an image.

To visualize colors in the image we need to follow the below steps-

1) Step 1: Import Necessary Modules

To this Concept mainly we need 2 modules.

- **cv2**– It is used to load the image and get the RGB data from the image.
- **matplotlib**– Used to plot the histograms.

2) Step 2: Load Image

To load an image, we need to use imread () method which is in the cv2 module. It accepts the image name as a parameter.
Syntax: cv2.imread('imageName')

3) Step 3: Get RGB Data from Image

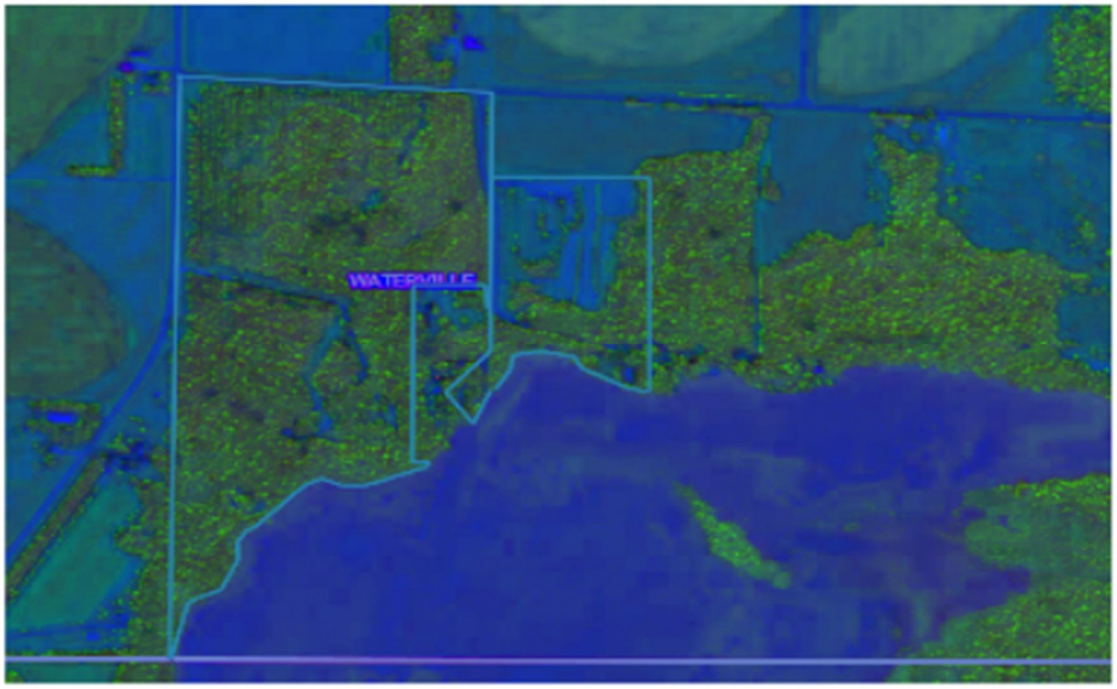
To get the RGB colors from the image, the cv2 module provides calchist method that accept image object, channel to get a specific c olor, mask, histogram size, and range.
Syntax:cv2.calchist([imageObject], [channelValue], mask, [histSize], [low,high])
Parameters:

- **imageObject-** Variable name in which image is loaded.
- **channelValue-** It accepts 0,1,2 values. It helps us to get the required color.
- 0 indicates blue, 1 indicates red, 2 indicates green.

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4) Step 4: Plot histograms

matplotlib provides the hist method which is used to draw the histogram on specified data.
Syntax: matplotlib.hist(data,color="value")



D. Image Processing to Pointing Places

The key concept in this regard is gray-level mapping. First linear gray-level mapping is discussed and exemplified by changing the brightness and contrast in images. Next non-linear gray-level mapping is covered. There is one of the fundamental concepts within image processing, namely the image histogram which mention in above. This is then combined with gray-level resulting in methods for improving the image quality and methods for binarizing the image by the use of a threshold approach. Due to the importance of the thresholding's different approaches are presented.

E. Show Spot on Image for Tree Plantation

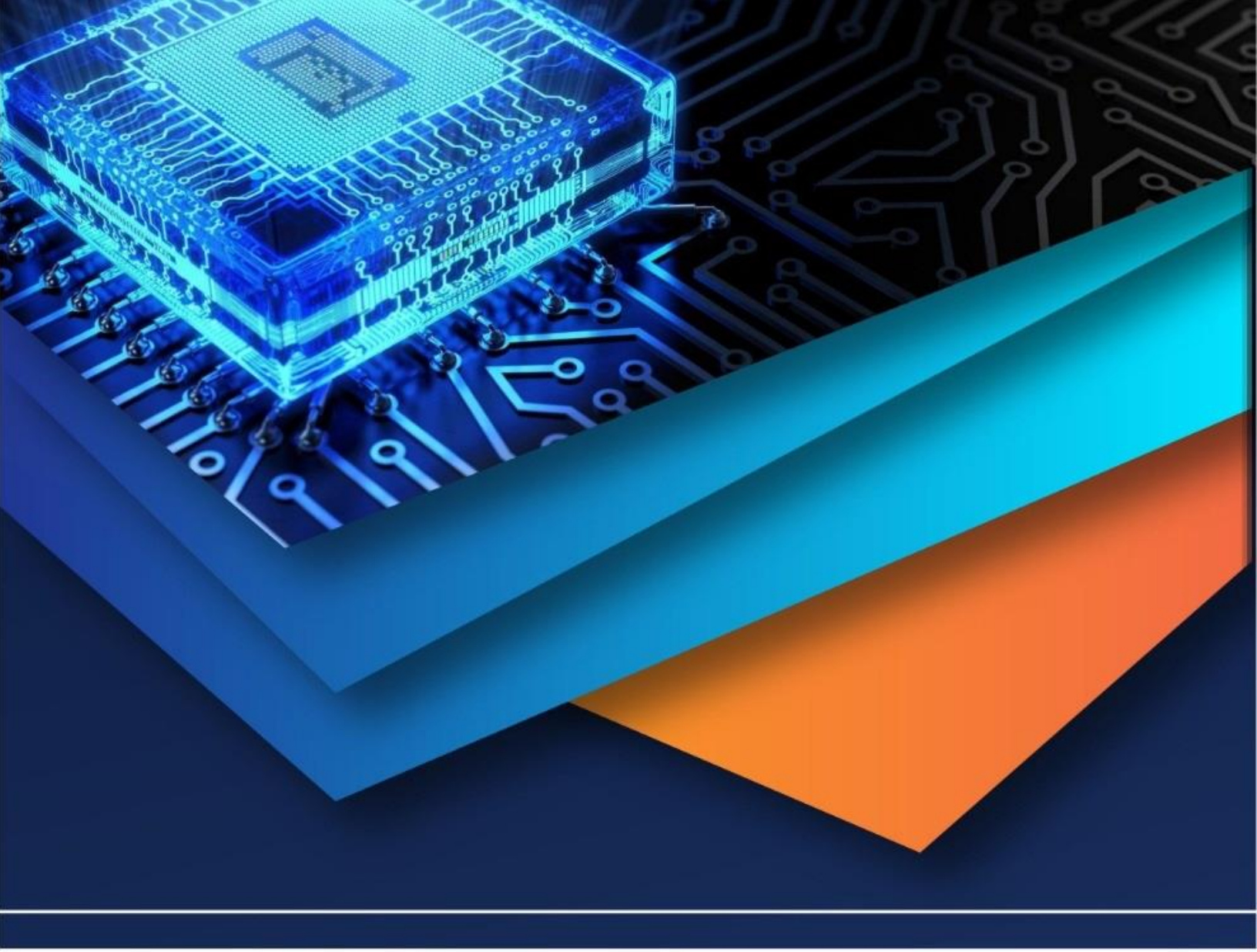
This module consists of as per above all modules processing done then after all the spot shows on image where we want to do tree plantation. This method highlights the region where the place is suitable for tree planation.

VI. CONCLUSION

With the advent of fast and cheap machines, digital image processing has become a very highly demanded field of study and practic e. It provides solutions to various real-life applications in an economical way.
Our project "Green path" is conducive to find out best way to tree plantation, saving time and extra resources and also human efforts , to meet the requirements of the times, to enhance people's quality of life and saves time.
You have seen a few of the features of a good introductory image processing program. There are many more complex modifications you can make to the images. For example, you can apply a variety of filters to the image. The filters use mathematical algorithms t o modify the image. Some filters are easy to use, while others require a great deal of technical knowledge.

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