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Landcover Quality Detection Using Segmentation And Content Base Image Retrieval Methods

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ABSTRACT
This paper tries to explore level and accuracy Content Based Image Retrieval method on Landsat imaginary. The images include an areal photography and land satellite photoraphy or Landsat which widely used and recognize for spatial information analysis. The analysis uses mapping of situation or state of earth's surface, particularly the land surface. Landsat can be used to create topographic map, determining of attitude or height model of a certain place in the earth. Aerial photographs are used to detect changes of earth surface, in this work the changes by using Content Based Image retrieval or CBIR. The accuracy changes measurement calculate using precision and recall parameters. In this paper, Landsat images also used to detect the appear and dis appear of vegetation and other objects on the earth. More than 100 Landsat images used in this work, and around 15 images was use d as queries. The results show that accuracy of image retrieval is a quite good , which more 75%.

Keywords: Landsat Images, CBIR, Precision Recall

1. INTRODUCTION

The grown always has been by an area and a physical appearance will be brought advanced. the increase or decrease in land affected by natural and human factors is physical growth. managing and finding good land use to develop an area requires good and accurate planning. to obtain valid information related to changes in land surface, an effective and suitavle method is needed. Physical characteristics of the land surface are from ground cover or land cover. Land covers can be forests, plants or trees, waters including lakes and rivers, buildings, and other objects. climate change, river channel changes, and human activities can change the land surface over time. It's just worth noting that most of the changes in land surface caused by human activities / activities. farming, settlement, mining and recreational activities carried out by humans can usually change the land surface. Briassoulis states that changes in land or land use can be classified in several stages, at different times, environmental characteristics, and human activities in certain regions. Changes of land surfaces to either increase or decrease or even damage to the surface of the land can be detected by conventional means or by utilizing satellite imagery such as aerial photography, remote sensing,

and Landsat imaginary imagery [1]. This research can map areas which have experienced damage and or change. Building a software application system to detect changes in ground surface quality as quickly as possible, accurately and automatically is also intended in this research.
Trying to reverse the accuracy and effectiveness of the regional growth segmentation method is the purpose of the work. determine changes or deterioration in soil or surface quality in certain areas using Landsat satellite imagery and aerial photography as well as other purposes. . By building a database of aerial photographic images (Landsat and Aerial photography). In addition, this research used to detect and is also intended to determine and predict when land covers occur. The work build a model or pattern of changes that occur in a certain period of time, and finally forcast how new circumstances will occur in the future on a land based on the pattern and what disasters are likely to occur in the future (disaster forecasting). This work tried to investigate the accuracy and effectiveness of the region growing segmentation.
The important thing to do is in the field of land use management, understanding and knowledge of landscape structures, changes in nature and altitude, and how these processes are affected.
The results of aerial photographs taken from aircraft and Landsat taken from satellites are still identified manually by relying on human capabilities which are very limited and very subjective as well as influenced by one's conditions and circumstances so that the results of the analysis are sometimes difficult to justify. in this manual analysis the very important is that no aerial database or Landsat aerial imagery has been built, so predicting disaster management and mitigation models is difficult.

2. RESEARCH METHODS

2.1 Data

Landsat imaginary data used to determine the quality of land using the CBIR method . Aerial photographic images consisting of Landsat images and aerial photo images. In streamlining the algorithm and reducing the complexity of the segmentation and detection processes, pre-procesing is carried out to convert aerial photography and Landsat formats into JPEG images, due to standard considerations, storage, and simple process. The image will be extracted by the call extraction process with a single or multiple extraction approach. then the image will be processed to measure the level of similarity of the image. in this process aims to get the value of an image similar to the test image.

2.2 Determination / Identification of Individual Vegetation

Search based on the similarity of colors, shapes, and textures is a CBIR method that is often used. Techniques for finding related images and possessing characteristics of image collections are also another meaning of CBIR.

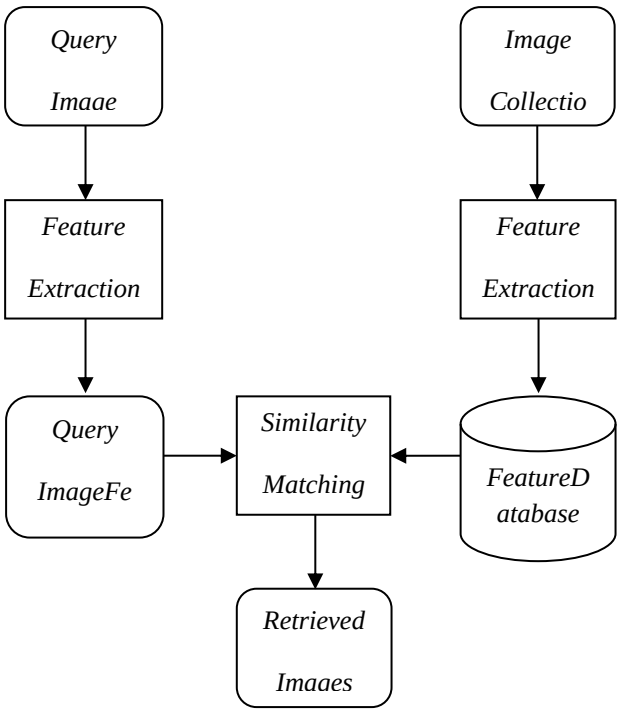

Figure 1. CBIR Architecture Diagram

The CBIR diagram can be explained as follows:

- First the user enters the query formation in the form of an image, then the query is extracted
- In order to produce feature vectors (special image features), whilst image data stored in databases will experience the same structure as query formation so that feature vectors are found
- After that will be compared with each other to find common ground
- Then after the comparison process, several identical or nearly identical images, the vector value will be selected
- After that indexing and data collection are selected
- So that the sequence of images is found (in the database) that has similarities with the formation of images (according to user wishes).

CBIR (Content Based Image Retrieval) flowcharts proposed in this study are as follows:

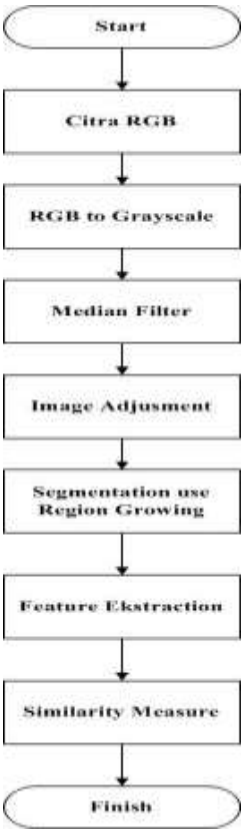

Figure 2. CBIR Flowchart (Content Based Image Retrieval)

The CBIR system in this study uses several stages of the process, namely, RGB image, RGB to Grayscale, Median Filter, Image Adjustment, Feature Extraction, Similarity Measure.

3. RESULTS AND DISCUSSION

Designation of a truecolor image is an RGB image. Digital images that contain a data matrix of size m x n x 3 that represent red, green and blue for each pixel are RGB images. Each base color is given a range of values. For computer monitors, the smallest range value is 0 while the largest is 255. The choice of the 256 scale is based on how to express the 8-digit binary number used by the computer. So that the total color that can be obtained is more than 16 million colors. the determination of each pixel color is determined by a combination of red, green and blue intensities. The advantages of the .JPEG format include:

- .JPEG format can provide colors with a depth of 24 bits, equivalent to 16 million colors.
- The .JPEG format is able to compress objects with a quality level in accordance with the options provided.

- The .JPEG format is smaller than the other file formats.
- Almost all digital cameras use the .JPEG format.

3.1. RGB to Grayscale

Region Growing Segmentation The first process carried out is to convert RGB images into grayscale images. In this process, the first thing to do is input the image (RGB image) will be converted to a gray image, the gray image itself is a digital image that has only one channel value at each pixel, in other words the value RED = GREEN = BLUE. an image that has an RGB color is a JPG image that is used as input, so it must first be converted to a gray image or also called a gray image. To convert a colored image that has a matrix value of each r, g and b into a grayscale image with the value s, then the conversion can be done by taking an average of the values of r, g and b.

Figure 3. RGB satellite images

Figure 4. Satellite images after Grayscale

3.2 Image Enhancement

Improved image quality in order to improve the image of disturbances that occur during shooting. Image quality improvement is carried out until the image is ready to be analyzed. The first process is conversion. In this study, the conversion made is RGB to Grayscale. The second process is filtering. Filtering is done in order to eliminate the noise contained in the image. Filtering is done with a median filter, which is a filter to remove salt and pepper noise. setting the image intensity (adjustment) to increase the brightness of all images to be processed is the third process. Adjust the intensity of the image with Image Adjustment.

Figure 5. Landsat image applied median filter

Figure 6. Landsat image contrast applied

3.3 Feature Extraction

At this stage, the image will go through an extraction process with a single or multiple extraction approach. The single feature extraction used is HSV and GLCM. Combination feature extraction is a combination of HSV + GLCM feature extraction. Similarity Measure, At this stage, the image will go through the process of measuring the level of similarity of the image. This process aims to obtain image values that are similar to test images.

This research will display the test results to prove the accuracy of CBIR (Content Based Image Retrieval) using query images and datasets in the form of landsat images.

Image	**Similar or unsimilar**
	Similar
	Similar

Figure 5. CBIR , Image Matching Similarity and Not Similarity

From the research observations as many as 40 query images, the results obtained from the level of similarity of images that match the similarity with the test images as many as 35 query images, and as many as 5 query images do not match the similarity.

3.4 Pecision Recall

The precision value formula used in this study is:

$$Precision\ (\mathrm{P}) = \frac{\text{Number of Relevant Documents Taken}}{\text{Number of Documents Retrieved in Search}} \text{ x } 100\%$$

While the relative value of recall is calculated by the formula:

$$Recall\ (\mathrm{R}) = \frac{\text{Number of Relevant Docuents Taken}}{\text{Number of Relevant Documents in the Database}} \text{ x } 100\%$$

Define the famous matrix as a measure of precision - recall according to Lancaster (1991) in Pendit (2008: 258):

Table 3.1 Matriks Precision and Recall Lancaster

Document	Relevant	Not Relevant	Total
Was found	a (hist)	b (noise)	a + b
Not found	c (misses)	D (rejected)	c + d
Total	a + b	c + d	a + b + c + d

Based on the table, the recall - precision formula is:

$$Precision = [a/ (a+b)] \times 100$$

$$Recall = [a / (a+c)] \times 100$$

4. CONCLUSIONS AND FUTURE WORKS

4.1. Conclusions

From the works carried some pounts out can be concluded such as:

- CBIR (Content Based Image Retrieval) method can be used to detect changes in land surface and visible differences in land surface from 5 years ago (2014) to the present year (2019).
- The Content Based Image Retrieval (CBIR) method can be used to predict changes in land surface over the next 2 years (from 2019 to 2021).
- The data sought can be found properly using Query Content Based Image Retrieval (CBIR).
- The accuracy of the Landsat image segmentation using the Content Based Image Retrieval (CBIR) method is judged as good because it produces a value of 84.0%.

4.2. Future Works

Researchers have limitations in conducting this research so that researchers have suggestions for further research. The suggestions given to the authors are:

- This research is expected to be used as a reference for researchers who will discuss changes in land surface.
- In this study only discusses land changes using the CBIR method, so that it can be further developed by researchers further with other methods in order to get better results.

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