"SATELLITE IMAGE STICTHING USINGMAPREDUCE"

Aparna S, G V Rohan, Harshitha M, Korrayi Saiteja, M Sravani

ABSTRACT- Satellite image merging is a method of combining multiple satellite images into one large image. Due to limitations in resolution, resolution, and spatial resolution, satellite images are captured as small objects. The joining method consists in combining and combining individual tiles to create a similar and harmonious image. This is done by identifying common features or objects in overlapping areas of tiles and keeping them at a distance. When finished, the pixels of each tile are combined, creating a transition between adjacent tiles, eliminating any seams or imperfections. However, these images, which are usually mosaic, can be combined using MapReduce. We propose a three-step process for integrating satellite images. Functional mapping, reduced work and merging.

KEYWORDS-Apache-Hadoop, MapReduce, Mosaic, Panorama, Bitmap, OpenCV, seam, Binary image.

I. INTRODUCTION

Satellite image stitching is the process of combining multiple individual satellite images to create single a single large image of a continuous area or a whole map. To get complete area in the single image the image stitching is performed. The major goal of this project is to implement a map-reduce framework for combining multiple satellite images into a single satellite image. This project allows recognition and extraction of objects from satellite images. The main aim of this project is to improve the accuracy of image stitching processes by using Hadoop architecture. This includes two stages, and they are reducer phase and mapper phase. The first stage is to convert images to bitmaps and the format of string and this is useful for Map Reduce functions. Mapper function generates space for the picture. The reduce function uses the output of mapper function as its input. This reducer function recognizes the highest number of overlaps among the images, and it will acquire matching position of the images. The images which are overlapped are going combine with merging algorithm. The results acquired from this can be utilized in image processing, Extracting features, mapping etc.

II. PROBLEM STATEMENT

The main aim of this project is to create satellite image stitching using Hadoop map-reduce architecture. The main concern is to process and merge the satellite images efficiently to create a single large image of a continuous area or a whole map.

Some challenges faced are

Data-processing in large scale: Satellite images are of large size and these images have high resolution. Processing this large amount of data is computationally difficult and it will consume time. The Hadoop map-reduce framework should be implemented to do parallel computing.

Alignment of the Image: Images taken from various places will have different variations like direction, positioning. To

generate the best output, it is very important to align each image.

III. PROJECT OBJECTIVES

With the expeditious development of satellite technology, satellite images have been used more effectively for numerous purposes.

Our subsequent goal in this project is to improve the efficiency of image stitching and accurately combine satellite imagery with the help of MapReduce framework while creating a high- resolution, blended and seamless image providing complete view of the area.

IV. LITERATURE SURVEY

which was published in the year 2016, deals with various feature-based image stitching algorithms. The publishers researched different techniques to extract, match, align and wrap the images. [1]

" A Methodical Review on Image Stitching and Video Stitching techniques" by Pravenna, S., Menaka.[2]. Released in the year 2016, it makes use of a direct method as a method to resolve the relationship between image based on extracted content.

MSER, SIFT, SURF etc. By Shaik and Patankar in 2015. "Multiple Feature Extraction Techniques in Image Composing" [3] used feature search and extraction tools.

A pre-processing step, Image registering is used to capture in different time zones. "Mapreduce based bigdata framework for object extraction from Mosaic satellite images" (2016)[4] by Sayar, S, Eken.

Auto-penalization with MapReduce paragon can be processed on huge amount of data."Mapreduce simplified Data processing Clusters" 2004 by Sanjay Ghemawat.[5]

An article presents a distributed Hadoop system with MapReduce paragon for image processing with SIFT, canny edge detection using Java libraries. "MIPr- based for distributed image processing using Hadoop", 2015[6]

Satellite data experiments to process high resolution images using Hadoop clusters have been very fruitful. "High resolution Satellite Image Processing in Large Clusters" by Rajak, Raveendran in the year 2015.[7]

Another development with Hadoop mapreduce library makes it easy to process images forming functional abstract concepts providing users with simple mechanism to manage large set of data. "Hadoop Image Processing Framework in 2015" [8]

V. METHODOLOGY

In this project, images are intersected with coordinates. It is a single node workable algorithm. The architecture consists of three functions:

Map, Reduce and Merge. New spaces are created, common points are identified and the two images are merged based on the common coordinates or overlaps.

A. RGB Image to Binary image and String

Color images are converted into binary images. These binary images are converted into bitmaps consisting binary elements. Either '0' or '255'. According to the threshold value, black and white pixels are assigned. '0' marks the black pixel and '255' marks the white pixel.

255	255	255	255	255
255	255	255	255	255
0	0	0	255	0
255	255	0	0	0
255	255	255	255	255

Figure : Bitmap for image1

255	255	255	255	255
255	255	255	255	255
0	0	255	255	255
0	0	255	255	255
0	0	0	0	0

Figure : Bitmap for image 2

B. Space Creation for Images

The possible matches between the two images is being calculated with the new space. The inputs are the string format and the output is generated with new space.

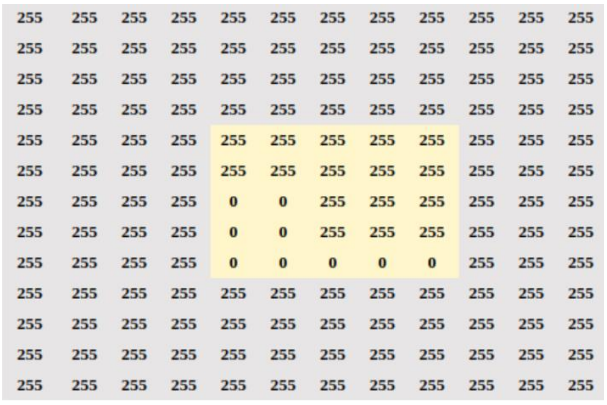

Figure: Image with new space in the bitmap

C. Calculation of Maximum no of overlaps between the images

Using the block size created with the reference to the size of the matrix, the first matrix iterates over the second matrix and counts

overlapping black pixels. If there is a one-to-one match between the first image and the second image, the black pixels in the index are counted. Count the black pixels together for all states. Record the intersection of the maximum number of intersections obtained.

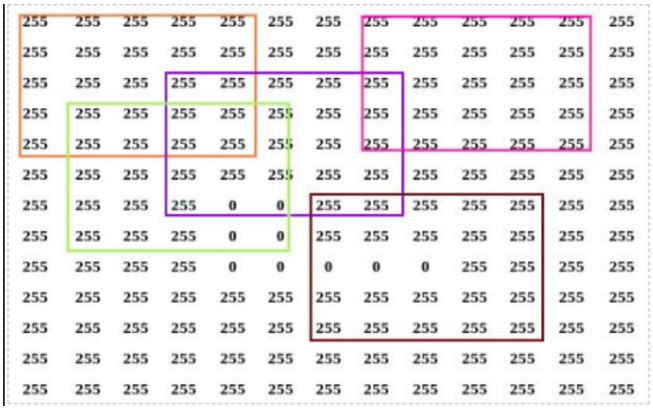

Figure : Frames between the two images.

D. Merging the Images

Images are merged using a maximum of intersection coordinates are calculated between the two images. The coordinate of the maximum intersection point obtained by combining the first image and the second image is calculated as the point of the second image. When the content matrix is overlapped at the black pixel values, can be seen to match. If

is taken as the size of the 1st image (pxq) and the size of the 2nd image as

(rxs), the size of the composite image is defined as (n + a) x (m + b). The merging algorithm of (pxq) size image 1 and (rxs) size image 2

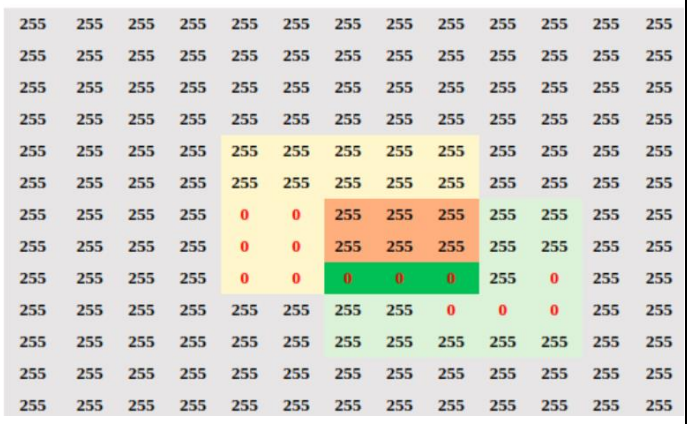

Figure: Intersection of the images

VI. RESULTS

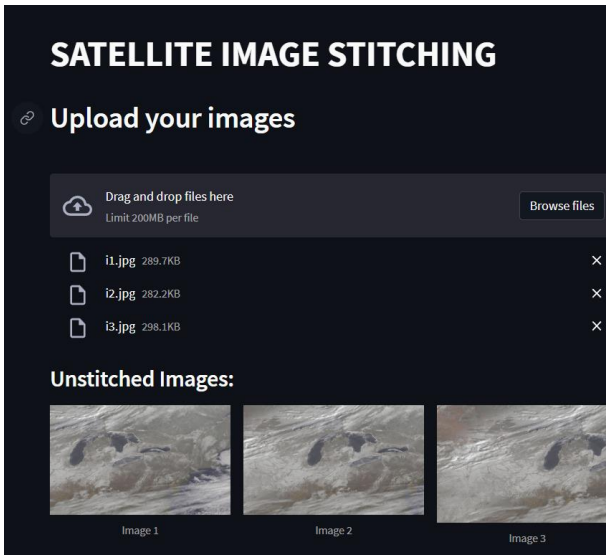

Figure: Uploading input images

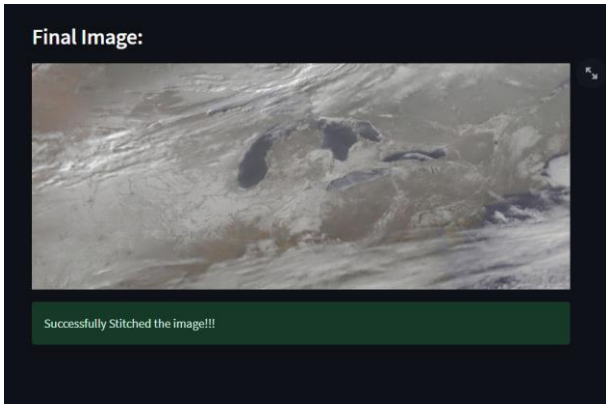

Figure: Final Stitched Image

VII. INDUSTRY ADAPTIBITY AND APPLICATIONS

Image stitching is used in medical applications such as combining many Xray images or MRI images to create a panoramic view of the body part. This allows doctors and radiologists to create detailed and detailed medical images that can be used in diagnosis.

Compounded images are designed to create a wide, expansive view of the area for security and surveillance systems. It combines images from multiple cameras or viewpoints, allowing users to monitor larger areas with fewer cameras.

Synthesized images are widely used in GIS applications to create mosaics of irresolution maps and satellite images. Combining multiple satellite images provides a panoramic view of the Earth's surface and environmental monitoring.

It plays an important role in image synthesis, remote sensing and ground observation. By collecting images from satellites or aerial platforms, scientists and researchers can monitor changes in land cover, study vegetation patterns, identify natural phenomena, monitor the environment, and measure the health of ecosystems

VIII. FUTURE SCOPE

1. This system can be developed and processed to analyze larger number of image datasets. It can be processed in parallel to achieve more accuracy with a higher rate of analysis.
2. The model can be computed with machine learning algorithms with satellite image process. The use of mapreduce eliminates maintaining the dedicated architecture.
3. Integrating the model with multiple sensors like optical, thermal, and radar sensors to generate comprehensive information about earth’s surface.
4. The combination of distributed computing skills and satellite imaging improves decision-making skills.

IX. CONCLUSION

In this project, we present a three-step algorithm: process the map, reduce the work and work together. The system can identify and extract objects whose location is in a satellite mosaic image. As mentioned above, the main goal is to improve the

performance of image synthesis using big data. We achieved it by converting the image into bitmaps which mainly has two elements: ‘0’ and ‘255’. Which is assigned to black and white pixels respectively and based on the discovery of new spaces in the image, overlaps are found and hence image is stitched seamlessly. i,e, completely blended image is yielded.

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