A Hierarchical Dynamic Image Processing to Detect The Smoke & Fire With Big Data Using MOSIACS

Vivek Singh Rathore
Computer Science & Engineering
Chouksey Engineering College
Bilaspur, India

Akhilesh Sharma
Computer Science & Engineering
Chouksey Engineering College
Bilaspur, India

Vinod Singh Kharsan
Computer Science & Engineering
Chouksey Engineering College
Bilaspur, India

***Abstract*— the paper design to overcome the losses of life from fire and smoke, proposed models for fire and smoke detection using image processing is provided without using additional sensors. The proposed solution is based on dynamic image processing using different mosaics pattern for both fire and smoke. The retrieve and analysis of mosaics are valuated using a statistical analysis of samples getting from different video frames and images. The proposed models can be used to detect the complete fire and smoke. It is focus to solve the issues in large areas. Past research works focused on developing the detection algorithms for processing video captured at real-times and also with sensor devices, it is required a huge amount of data storage and large scale processing therefore the complexity of algorithms is increases. The proposed method based on map-reduce function that clean and pre-process the large area video captured from the local site video devices. It basically works on frames of the video data of central cloud.**

***Keywords*— Fire, Smoke, mosaics, large data and map reduce algorithms.**

I. INTRODUCTION

In the modern era many smoke and fire detection system has been studied. The development of detection system in digital technology and in video based processing; video based systems generally use the three characteristic features of smoke and fire: that is motion, color and geometry. [1] The pre-processing step is generally color information in the detection of possible smoke and fire. In the past smoke and fire detection in several areas it was high risk, it is required regular monitoring of such areas. There are several aspects to Improvement the monitoring systems, it can study in several directions: increasing possibility of smoke and fire detection in the past system, reducing the cost of manual monitoring, reducing the human interaction, etc. [2] Many researchers have been already implemented to find a more appropriate way of smoke and fire detection. Smoke and fire detection process take time as one of the most important parameter for further implementation. It gives the opportunity to work in a real time system. The work under the system called smoke and fire detection and prediction of large-scale areas. [3]

Now days, image processing is widely used in various areas such as health, military, scientific and engineering etc. Image processing is a technique that converts an image into digital form and performs various operations on it. In order to get the necessary information from images. There are two types of image processing technique used in the processing, which static and dynamic image processing. The proposed method is based on dynamic image processing. [4] Dynamic image processing is also treated as real time imaging from local resources, real time imaging database allows real time rendering of images. The proposed method basically work on two phase, first is mapping phase and other is reduce phase. [5] Mapping phase required some set of dynamic images furthermore the input dynamic image is divide into frame sets each frame set consist a number of small frames of the image, hierarchical division of images generate a huge amount of data it is also called as big data and hence triggers to save the data storage space and processing efficiency. The question is how to select the individual frame from the set of frames; the solution is iteration method which is used to select the individual frame. This process is executed repeatedly for all frames but iteration method will be separate. The next step consists to create mosaics from frame and store all the mosaics data set into central database. [6] A mosaic is a small picture that is divided into different polygon sections, each of which are matches with the target image [12]. A mosaic is formed by splitting the source image into polygon sections of smaller sub-images and then searching for the best match for each and every sub-image in a usually large set of stored images of central database. The best match can range from average color comparison, through histogram comparison to pixel-by-pixel comparison of the images. [2]

The implementation phase starts with input but instead of whole image it is allow only mosaic as in image. The mosaic selection reduce the processing time and optimize the speed, moreover the pattern recognition of mosaics is performed by the algorithm with already stored mosaics in the cloud that also tell the image position and name finally the result is printed as graph between the frames and times to process the frames. [8] Since the color based pre-processing is vital part for all image processing our fire and smoke detection system is also based on that, an efficient model is needed. In this proposed work, we have further improved the model defined in our previous work to detect fire pixels and smoke pixels and proposed a model for smoke and fire pixel

detection using mosaics. The proposed model for fire and smoke detection is compared with the existing techniques. [9]

II. BRIEF REVIEW OF PAST WORK

A Hierarchical Distributed Processing Framework for Big Image Data" This paper introduces an effective processing framework of Image Processing with the data explosion in image processing field. While most past researches focus on optimizing the image processing algorithms to gain higher efficiency, our work dedicates to providing a general framework for those image processing algorithms, which can be implemented in parallel so as to achieve a boost in time efficiency without affecting the results performance along with the increasing image scale.

Productivity frameworks in big data image processing computations - creating photographic mosaics with Hadoop and Scalding" stated that in the last decade, Hadoop has become a standard framework for big data processing in the industry. Although Hadoop today is mostly applied to textual data, it can be also used to process binary data including images. A number of frameworks have been developed to increase productivity of developing Hadoop based solutions. This paper demonstrates how such a framework (Scalding) can be used to create a concise and efficient solution to a big data image-processing.

A Review on Hadoop MapReduce using image processing and cloud computing" Hadoop is an open source framework that allows distributed processing of large data set across clusters of computers. Big data describes technology to capture, store, distribute and manage the large size data set. Data is generated by different sources such as from a web site or click streams (e.g. net ix, Face book, Google), Sensors (energy monitoring, application monitoring, telescope) and biomedical diagnosis. Image processing is perform important function in various research areas such as biomedical imaging, remote sensing, astronomy, internet etc.

Big Data for Remote Sensing: Challenges and Opportunities. In this paper, we specifically analyze the challenges and opportunities that big data bring in the context of remote sensing applications. Our focus is to analyze what exactly does big data mean in remote sensing applications and how can big data provide added value in this context. Furthermore, this paper describes the most challenging issues in managing, processing, and efficient exploitation of big data for remote sensing problems.

III. PROPOSED WORK

I analysis and conclude from the past research of the last decade. The fire and smoke detection done by the simple detection algorithm on static image using sensors but not in dynamic image as well as without sensors because of sensor device network require a lot of extra cabling to be installed around the area where it is going to be used allow sensors to work unless the sensors are wireless using wireless sensor devices much more expensive. Dynamic imaging aimed to process the large amount of data that is some time referred as big data. Big data is consisting as extremely large data sets or huge amount of data is mosaics that may be analyzed computationally to reveal patterns, trends, and associations especially relating to human behavior and interactions. A mosaic is a small piece, where image made from the group of small pieces of colored mosaics mostly mosaics are made of small pieces. In past work mosaics is divided into rectangular section or grids but not in polygon sections furthermore it is categorized into three levels as tiny, small, medium and big mosaics only.

IV. PROPOSED METHODOLOGY

In the proposed method the detection of fire and smoke are often follows the two possible ways, mapping phase and implementation phase. The proposed method is based on dynamic image processing, that basically work on two phase, first is mapping phase and other is reduce phase. Mapping phase is actually machine learning technique that required some set of dynamic images moreover the input dynamic image is divide into frame sets where each frame set consist a number of frames of the input image, multiple division of images generate a huge amount of data it is also called as big data. A mosaic is formed by splitting the source image into polygon sections of frames and then searching for the best match for each and every sub-image in a usually large set of stored images of central database. The best match can range from average color comparison, through histogram comparison to images. Mainly these two ways are implemented as: successive frames mapping and reduce method. In the above given methods where the first method create the mosaics from the dynamics images during the each transition from one frame to another frame of video information. The second method starts with input but instead of whole image it is allow only mosaic as in image. The mosaic selection reduces the processing time and optimizes the speed, moreover the pattern recognition of mosaics is performed by the algorithm with already stored mosaics in the cloud that also tell the image position and name finally. The proposed steps for the mapping and implementation of the dynamic image given below:

4.1 Mapping Phase

Mosaic creation may be relatively easily expressed in the mapping paradigm. In the mapping phase, for each dynamic image of cloud, we find it is average distance with all the polygon cells of the image. The outcome of the mapping phase can be visualized as heat map with greens cells representing a better fit.

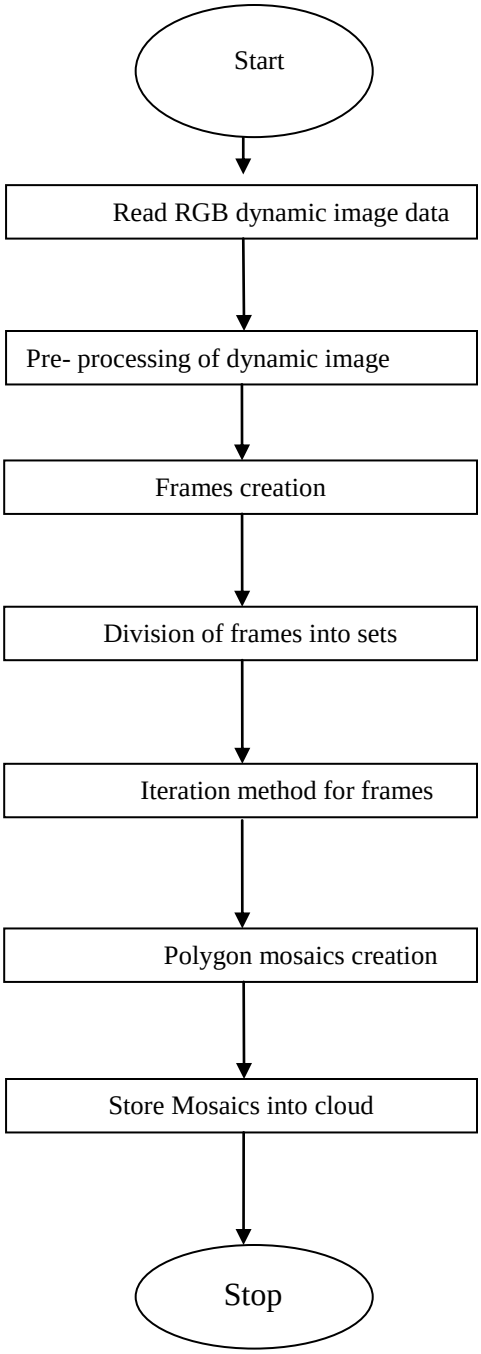

Figure 1: Map phase of mosaic creation

To create a polygonal mosaic, we need an input image. In this proposed work we are going to create a set of polygons. Polygons are polygonal shapes which sides are line segments. The line segment consist a stroke of black color and the area inside of polygons transform mosaic. Let's see how proposed system will create the polygon on the apple.

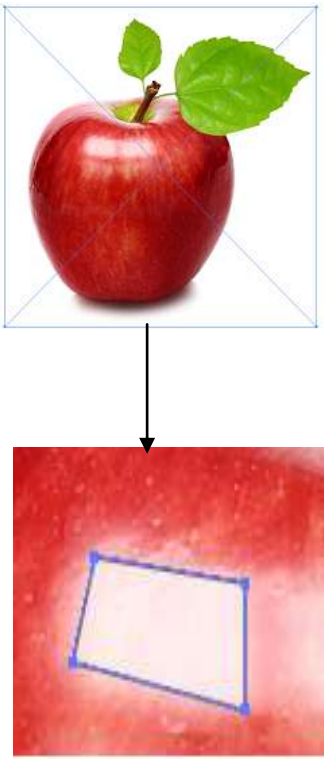

Figure 3: Single Polygon creation step

Create a number of polygons from the input image, but without contain any gaps between the polygons. The steps are repeatedly perform for the frame of frame sets, successfully execution of process generate huge amount of polygon mosaics and all the mosaics should be store on centralized database. The step diagram is shown on figure:

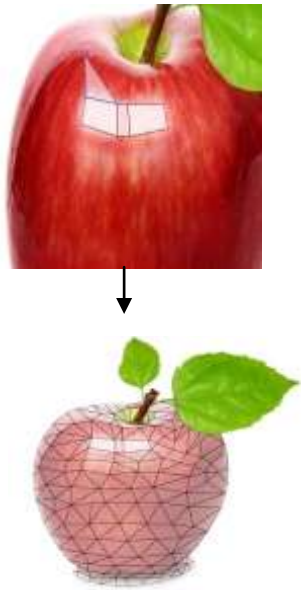

Figure 4: Multiple polygon without any gaps

V. CONCLUSION

The proposed work presents an application of mapping and implementation framework for solving a large dynamic image processing problem of creating mosaic and matching. The high level flow framework with MapReduce method and allows the key role of dynamic images to increase the time efficiency. The proposed work focus on calculating the binary representation of the dynamic images and its values, other characteristics of the datasets as small, medium and big mosaics. The results of the final implementation phase are considered with the following keys like number of images, average size of images, total size of images and average time to process images.

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