

A Survey: Image processing in Real-Time Big Data Analytical Architecture

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Abstract

Remote sensors generate the huge amount of data from satellites. Nowadays, there is a large demand for real-time data for remote sensing applications, and to extract useful information from the data. This paper examines different mining approaches in various satellite image processing applications. A two level merging approach is used to extract the sea area. But, the performance is lower due to the lack of feature extraction. The sensors are deployed to feature out the temperature and pressure for the fire detection. It results in the prediction of fire and is of the high cost. Whereas, Sea-land segmentation using meteorological datasets are carried out only offline. Thus, it is necessary to design an architecture that supports both offline and the real-time data analysis. In addition, scale invariant feature transform and various algorithms can be used as to elaborate the working of real-time data analytical architecture.

Keywords: Big Data, Offline, Real Time, Remote Sensors, Land & Sea Area.

INTRODUCTION

The advancement in the computer technology and remote sensing increases the huge amount of sensing data. The earth observatory data from spacecraft is around 1.7GB, this data is collected by single satellite. This massive amount of data has to process to extract the useful information. Thus, there is a need for architecture for load balancing, data aggregation, and decision analysis.

Recently, Orfeo toolbox is used to process images in large volumes, combined with Map Reduce and HDFS [4]. Orfeo results in an efficient and reduced execution time, but shortcomings in high-speed data processing. A problem with the big data analytic was the lack of coordination between databases. Thus, analysts were impeded by a tedious process of exporting data from the database [5]. The analysis of data using Hadoop results in fast parallel processing of data. Many data mining algorithms are migrating towards Hadoop, but the speed-up of the parallel k-means algorithm is not linear. The main reason results in non-linear were that the communication overhead increases as increase the dataset size [3]. These problems can be solve by using real-time analytical architecture.

Remote sensors collect a large amount of data from the satellite. The collected data has no meaning. The useful data need to get the extract from the collected data. Sometimes, the collected data might be not clear. To resolve such problem; uses an architecture to analyze real-time and offline data

DATA MINING TECHNIQUES

Data Mining is a wide spreading area that offers a great platform for research. Mining techniques can be implemented on existing software platforms as well as hardware platforms, and can be integrated with systems. Data mining is supported by three technologies, namely, massive data collection, multiprocessor computers, and data mining algorithm.

The five techniques of data mining are:

- **Association:** It is a simple technique to correlate two or more items.
- **Classification:** Uses decision tree to determine the classification.
- **Clustering:** Clustering is a method of dividing data into groups of similar objects.
- **Prediction:** Prediction method is the combination of trends, classification, and relations.
- **Feature selection and extraction:** It is an attribute reduction process. The data collected from satellites are then extracted to get useful information's. Then the feature extractions are carried out for further data processing.

SEA-LAND SEGMENTATION

From the remotely sensed images, the land and sea area can be segmented, by using Local Binary Pattern (LBP). LBP is more suitable for remote sensing image processing. For a land pixel, LBP finds out to always zero and to the real land pixel from satellite images, LBP is always not zero. Which will bring out false alarms . Thus, needs a method to reduce the false alarm rate and to segment the land and sea with high precision. The other issues in the existing method to segment land and sea are scalability and the data collected from remote areas are not ready for analysis.

LANDSAT 5 satellite images are used for segmenting land and sea area [2]. But, LANDSAT images do not meet the requirements due to scalability and resolution issues.

The data collected from sensors are used to separate the land and sea area. It is more challenging to the coast line extraction and in object detection. The various objects on the ground make land prediction more complicated than sea area. The hierarchical region merging approach is used to automatically extract the sea and land area [2]. The merging approach can be better characterized by supervised information combined with the feature extraction. This results in bringing out a real-time analytical architecture to detect land and sea area.

FIRE DETECTION

Forests are an indispensable resource. The occurrence of fire results in increasing damage to the ecosystem. It is necessary to take measures against the forest fire. This requires an efficient method to detect forest fire in real-time monitoring. The Aerial vehicle, ground-based techniques were used for the detection. Moreover, hazardous fire can exploit the life of aerial pilot and the limited range is in ground-based measurement. Temperature and humidity are the main components in fire detection. Set a threshold value for humidity and temperature and check out the sensor readings, if both readings are same generates an alarm indicating the fire is detected. The sensors are deployed to sense the carbon monoxide, humidity, carbon-dioxide and the temperature. The cluster head sensor node collects the data from the corresponding cluster nodes. The control station receives the data from the cluster and the data processing is performed. The main aim of such system is to decrease the fire irrespective of high cost. The slight variations in temperature and dust particles causes the sensors to report fire delay. If a node gets malicious, then the node can interrupt the data process. Hence generates incorrect information.

Visual detection techniques can reduce the fire delay and results in fire detection accuracy. Visual techniques combine sequential method and color verification technique to make the easy fire detection. Requires a real-time monitoring system to detect the fire with high precision. Satellite images give real time information to predict the hazards. Analysis of image by extracting the pixel in real-time results in the prediction of fire detection with the least amount of cost.

Camera surveillance systems can be used for the detection of fire. Camera or Optical system can reduce the false information about fire by capturing each movement. Forest-Watch is a camera system for semiautomatic fire detection. Camera need to install by humans. Capture images within a range, so camera sensor system results in an inefficient detection method. Camera sensors are of high cost. It is necessary to provide a system that detects fire in real-time with less cost. Forests can contribute high amounts of economic wealth. So, it is necessary to carry out some approaches to detect and extinguishes fires. Fire causes an environmental damage to human lives.

By fire modeling, can predict the possible fire behavior without getting burned [3] . Most of the fire detection approaches are based on satellite images. Also, the sensors are deployed in the forest area to check out the temperature. Each sensor nodes are well maintained with a temperature sensor. When there occurs a change in temperature, the sensor nodes send packets to the cluster nodes. But, when the node gets damaged results in error temperature readings. The image processing techniques are used to overcome the sensor node issues.

CONCLUSION

The data collected from remote sensors are the challenge to the coast-line extraction. The lack of feature extraction in the merging techniques results in the prediction of land and sea area with less precision. Sensor nodes are deployed in the forest and is equipped with a temperature sensor to detect the fire. But when the node gets malicious, it results in error temperature reading and outputs a false alarm. To reduce these issues, used image processing techniques. These techniques may not perform well in real-time monitoring systems. Whereas, the real-time data analytical architecture can analyze both real time and offline data process. Along with various algorithms, the architecture is also used to detect the land as well as sea area. In future, a scale invariant feature transform algorithm can be used to detect the fire. The occurrence of fire will get notified to the corresponding base station.

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