3-D Face Image identification from video streaming using Map Reduce(Hadoop)

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Abstract—*This paper focuses on the massive face identification system. I want to recognize a face from a lot of faces at public places. There are two of techniques are used to hit the goal: one is the 3Dface identification technique and the other is the Hadoop detection technique. Face identification technique find a similar face by 3D face features form mass face data. The Hadoop is a parallel processing structure; it can boost the computation ability. From imulation outcome, it is demonstrate that our algorithm is an efficient and accurate method for huge face identification.*

Key words—huge, Face identification, Hadoop, Features, Parallel Processing.

1. INTRODUCTION:

Face identification is important task for several applications on human being life. There are some examine was published and described it below. I detect faces by using a hierarchical knowledge-based method. I use three level resolutions in their algorithm. The coarse-to-fine strategy reduce the computation is an advantage in this method.

I also use local feature detector and random graph matching techniques to create a probabilistic method can locate a face in a scene. By using five features like two eyes, two nostril, and Nose/lip junction to depict a typical face. I am trying to define a facial template and relative distances of any pair official features. This method can detect the testing object is a human face or not.

I will use a general and complete face detection technique. It is a valuable method for face detection and surveying detecting faces in images.

For face image comparison, it is a hard work because it needs a lot of working out and it cannot achieve 100% accuracy. If I want to improve the comparison accuracy then the multiple face indifferent angle can be achieve the goal. Furthermore ,if I want search a people from public places, it is more difficult because it is related to real time operation problems. It is a massive computation. However, the parallel processing technique increases computational capacity. For a huge data, it needs massive computation ability. It needs several computer works together to share the data. Therefore, Hadoop structure is a suitable system for solving the huge face identification difficulty.

The main aim of this paper is to develop a simple and effective face identification system on them assize video string.

II. Face Identification

A. an Object retrieve from the video string The first stage of the face identification is to object retrieve. Once the individual face obtained, the face recognize can be carry out correctly. Figure 1 shows the flow chart of the object extraction from the video stream. Since the video input video is color string, The system convert the color image into gray scale image for reducing the computer computation.

Next step is to find out foreground object from the background image by using multiple background extraction modules. A media filter used to filter out the noise. An exclusive bitmapping (EB) technique issued to convert the image from gray scale to binary even on differently exposed environments. Usually, the object image extraction will causing some distortion, thus, image processing (IP) techniques like the dilation, opening, and closing techniques are used to remedy the drawback. Finally, a small area discard stage is used to delete those objects which are belonging to noises because those areas are so small. In addition to, by the person structure; I easily extract the human face location by scale method of object. The system compare the face location with the previous frame to make sure the object is brand new or repeated. Once the objects are all examined, I refresh the previous frame and record the new objects. At last, system stabilizes the object and run the next frame. The details flowchart is described in figure 1.

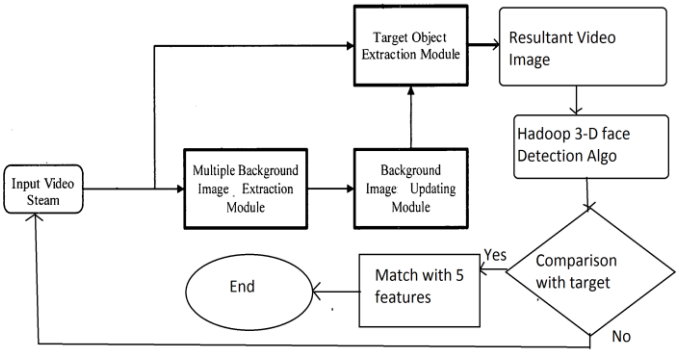

Fig. 1 Object extraction and matching with the resultant image.

A. Three-D Face Identification Algorithm

The 3D face identification is better than 2Dbecause 3D method has lots of features. In this paper, I use the skin color and principle components scrutiny techniques to achieve the face identification. At first, I get the left and right images that include face components. Next, the color image normalization stage used for further skin color

Detection. In order to obtain the face area, the several stages include Erosion, Dilation, Labeling and Padding is used to achieve the goal. However, the normalization stage is necessary to make the face image standard. Finally, 3D face identification can be completed by using following three steps;

I. Merges the left and right image form a 3D image.

II. Execute the principle component analysis to get the features.

III. Verify the features by comparing the input image and database.

Figure 2 shows the details of the system.

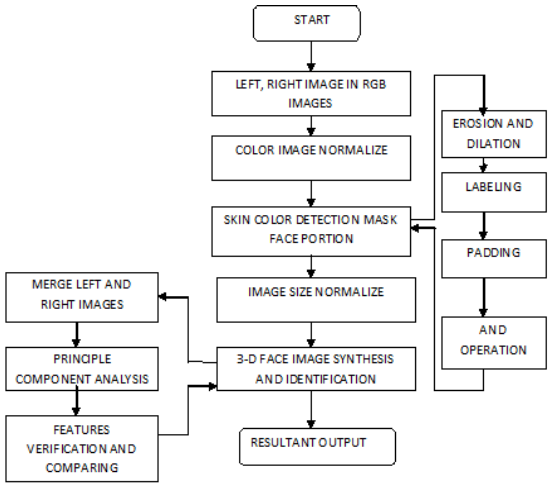

Fig.2 Shows 3D face identification.

B. The features and decision function

The face features of this paper totally have 15numbers as figure 3 shown. The important points of the face are denoted in the face image as the listed A to J. The fifteen features are the distance between the each two points shows in figure 3. For example the distance A and B express the feature of the distance between two eyes. The feature IJ denotes the width of the mouth. The feature EK is the distance between the center of the two eyes and mouth.

There are two steps for the decision function; one is the error of the feature that is the difference between the input image and database under the threshold.

The first step is check the features if one of features is over the threshold that it is die out. The second step is calculating the features error that is the error by compare the input image with the database. Once the accumulation error is the minimum then it is the answer.

Fig 3 the sketch of the face features

III. Hadoop System

Since the 3D face identification from a video stream is calculation utilization, a big data processing technique is needed to achieve the goal. For our case, the Hadoop technique is suitable for huge face identification.

A. Massive face identification structure

Massive face identification system is used to obtain main information from lot of people and public places. For this case, to find a person from massive people, it is a big data problem need a technique to reduce the obscure and finish the job.

Hadoop structure is an efficient parallel processing technique can solve big data problem. Figure 4 shows the Hadoop system that was used in the massive face identification. It is clearly, there are two module blocks; one is the subscriber verification and the other is subscriber increase.

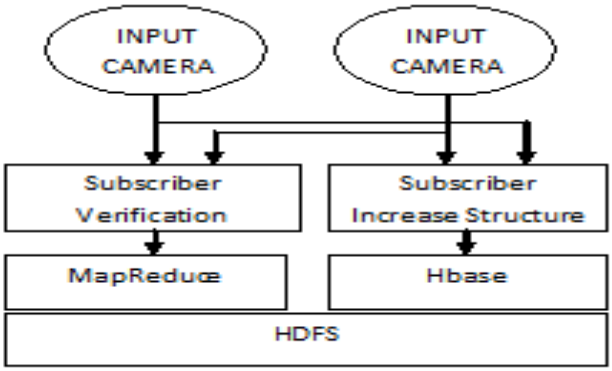

Fig.4 Shows Massive face identification structure in Hadoop.

The task of the Subscriber increase module is receive the subscriber information. The increase module pass through the face image get from the camera and is used to add new subscriber. For accuracy, the photographs include different light surroundings, different background, different angle and facial expression. Those photographs are stored in the database for the next time for face identification comparing. The subscriber information recorded in the database includes the name, id, age and photograph. The task of the subscriber verification module issued to search and identify the input face image with the database. It makes sure the exactly people by comparing with all the database image, and pick up the one is the least features error. This action needs immense computation; therefore, it is the need of the Map and reduces techniques under parallel process to accelerate operation speed.

B. The implement system

The implement system of the Hadoop structure is shown in Figure 5. It includes two processes; Mapping and reducing. The nodes of the Hadoop structure maybe are failure. If a node is on failure state then the task need to be reassigned. If the task include some side effect then the share state need to restart. For example, the nodes communicate with the outside node, and then the share state must be hold until the system restart.

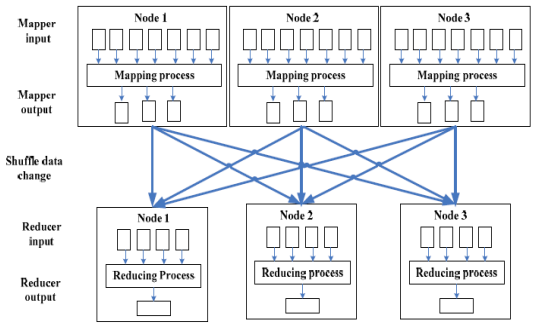

Fig. 5 the implement system of the Map/Reduce stream

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In Hadoop structure, just only inherit the Map Reduce Base class, it can offer map and reduce classes. Besides, the Hadoop structure can automate operation in distribution state when it registers Job. For example, I have 100 pictures want to compare with the 3 million subscribers that each subscriber has30 pictures in the database. If each picture with length is 2048 by 2048, then the size is equal to 2048*2048=12.5MB. This is an enormous computation task.

Hadoop adopt paralel operation technique. It uses the multi-server of the cluster to compare with several pictures. This can reduce the time for identification. For example, I set 25 servers in a cluster and let the task of the Map is 25, the task of the Reduce is 4. If the waiting subscriber is assign to the 25 server then the jobs of each server is 1/25 of all jobs.

The process of the Map is as below; It uses the subscriber id and picture number as the input key. Use the subscriber picture as the input value. Simultaneous, use the subscriber id and picture number use as the output key. The comparison results of the between the subscriber picture and input image are used as the output value. The input of the Reduce process is the subscriber id and picture number. It target is to obtain a maximum value of the comparison results by using input key and front half subscriber id. On the other hand, the Reduce process use the subscriber id and picture number as output key, and use the similarity of the test image and subscriber as the output value.

According to the Reduce output, the system sorts the likeness of all the subscribers to get the most similarity subscriber id and picture number. When the subscribers increased, the system just adds the cluster class can support more operation. This is the advantage of the big data techniques.

IV. The Problems and Performance

A. The problems

There are some problems about this system as listed below:

(a) Due to 3D face identification have large features, It is hard to predict which is the exact result.

(b) If the subscribers too big, the system can't make sure to obtain the accuracy result in real time process. For example, there are 23 million peoples and Have90 pictures of each people then the system had totally more than 2 billion pictures. It is too big and hard to process in real time.

B. The performance

The performance of the big data system is based on the parameters and structure of the process. There are some methods can improve the performance and listed as below:

(A). I use to adjust the numbers of the Map and Reduce to realize improve performance.

(b). Set a suitable path of the Name Node and Name Node Federal technique to solve the Name Node breakdown problem.

(c) Design a suitable H base to raise the performance of the system inquiry by means of the problem analysis.

(d) According to the features of the face, adjust procedure design of the Partitioner, grouping, sort and combiner in the Shuffle of the Map Reduce process to raise the system performance.

V. CONCLUSIONS

In this article, I use the distribution and parallel techniques of the Hadoop to raise the computation speed for the massive 3D face identification. From the simulation results, it is established that the computation speed increases3.5 times under the simulation condition on four computers a cluster and one hundred subscribers. When the subscriber increase, the system only extend the cluster which can achieve the high performance face identification at big subscriber.

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