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Research Based on Cloudy Data Store Circumscriptive Real-time Demographic System

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In order to determine the people's location and number in the disaster area, such as fire, earthquake and other emergency accidents region, and raise the efficiency of search and rescue, we proposed a cloudy data-based saving regional real-time demographic statistical system., which is mainly constituted by four modules, namely, the target recognition, the local area network server (LANS), the integrated management platform and the remote client. This system applied the strategy of vertical shooting and the technology of head recognition as well asthe target detection, and it also analyzed the headcount information accurately in the specific zones by LANS and management platform to share data with other similar module units in the cloud then generated a ground headcount statistics with huge data. The system combined the map's locating display function and utilized PC or other mobile terminal easily to count the headcount in the specific area. It can not only provide scientific data support to the government rescues department to rescue the victims quickly and effectually from the disaster while decreasing the casualty maximally, but can function in other applications such as school, shopping center and enterprise, etc.. It would be widely used in the future.

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1.Introduction

When a fire happens, the firefighting devices such as fire exit, fire hydrant and fire squire is limited. Rescuers have to search the victim level-by-level because they're unaware of the victim's specific location, which has reduced the rescue speed greatly and led to unnecessary death because of untimely rescues work. Hence, the rescuing time is the key element that decides the survival rate of people during the earthquake. In this sense, the key issue is the victim's tag and the obtainment of their location in rescue in the fire or earthquake. The demographic system is able to identify the victims' distribution situation and their precise location in the building, and then enhance the purposefulness of the rescue and raise the efficiency [1]. With the development of technology and informationzation, inefficient statistics can not meet the requirement and a roboticzed and intelligentized demographic statistical system is extremely essential. Under this circumstance, we proposed a cloudy data-based saving regional real-time demographic statistical system.

On the early stage, due to the limitation of technology and the equipment, it is hard to achieve the video image processing at real time. With the improvement of the computer intelligent monitoring technique, the demographic account has been included in the intelligent monitoring application rang. This statistical system combined several field techniques such as video processing, image processing, fuzzy diagnosis and artificial intelligent. At the moment, according to the video &image processing techniques, there are 4 main methods used to remove the statistical issue in the world, namely single & multiple object identification, perpendicular scene shooting & eyelevel shooting, image-based identification and movement-based analysis [2]. This system has compared the exiting technology and applied single object identification, perpendicular scene shooting, head image-based recognition and gait recognition movement analysis technologies.[3-5]

The cloud calculation is a fusion product of traditional computer technology and internet technology development which includes grid computing technology, distributed computing technology, effectively computing technology, network storage, virtualization and load balancing technology. This method is a internet-based calculation mode which has centralized the computing from the client to cloud. Our headcount statistic system has used the cloud technology in the middle and long distance client control.

Our research project is to design a demographic statistical system capable of determining the headcount accurately in the specific zone. Based on the cloud calculation, the system statistical information is able of troughing internet to generate the big data report and then realize the remote client review.

2.Demographic Statistical System Design

This system is operated on the windows executive system, links the camera with personal computer (PC), uploads the real-time collecting data to PC to process relative image information, recognize and count the in-out people number passing the exit gate.

2.1System Platform Selection and Establishment Design

As that relative picture and reorganization are processed by the system, it is suggested using the efficient Core i5 serial processor, 8G memory bank and HIK vision camera which

features a high clarity degree. Then the collected video frame would be sent to the PC via interface for further processing. The perpendicular scene shooting plan is applied to this system. Hence, it is necessary to set the camera at appropriate location and height to avoid the complex background environment, simplify modular processing and improve the operation efficiency.

2.2Function Requirement on Analysis Design

As this system is emphasizing the calculation design and the realization process, it is not difficult to realize the requirements on the function; specifically speaking, 1) the images should be fluent and integrate to satisfy the client's requirement of reviewing the monitored exit environment, 2) the system should have the monitoring switching function to provide the convenience of system controlling, 3) it is able to count the passing heads and real-time display to client; 4) it has a option of marking the passing targets in the video frame.

2.3 System Structure Design

When dividing the whole system into several sub-systems, it would decrease the system's complexity and minimize the interdependency and communication among the sub-systems. Thus we introduced an appearance objective into the system design which could apply a single and simple interface to the generic device. All the sub-modulars have used STRATEGY mode that could encapsulate different calculations, increase the independence and decrease the interaction between the arithmetic and provide the suitable calculate method (eg. applicative scene or calculation's time and space) to fulfill different requirements.

This system is mainly constituted by four modules, namely the target recognition, the local area network server (LANs), the integrated management platform and the remote client. The structure is showed on Fig.1.

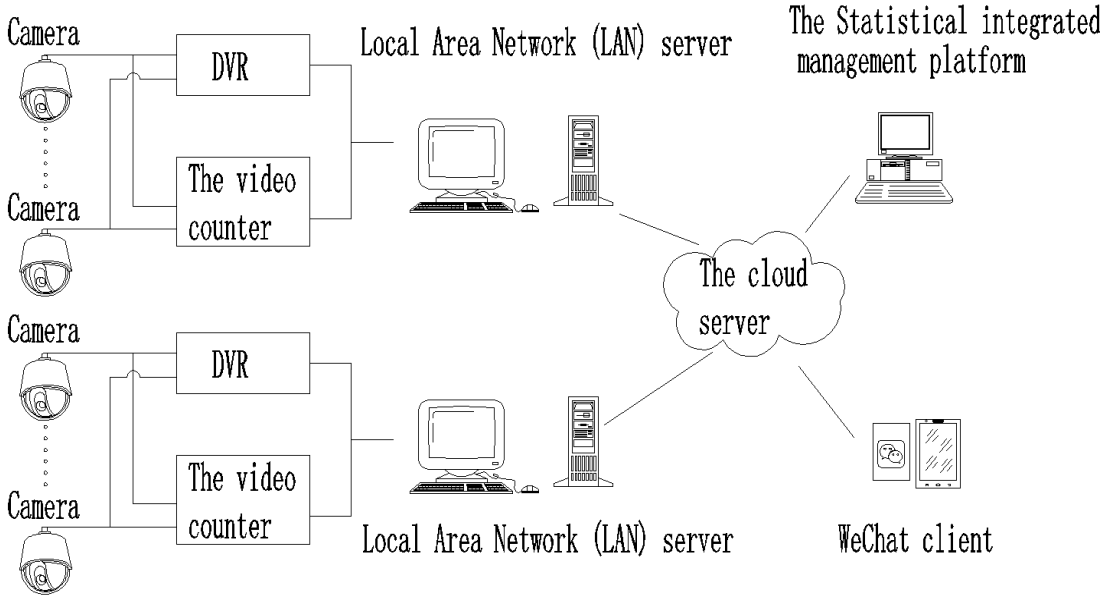

Figure 1: Structure of Population Statistics System

3.System Structure Analysis

3.1 Target Recognition

The target recognition, as the core of this system, is responsible for analyzing the input video, accounting the people who are passing the passageway or atn the specific area. The main monitoring scene is the gateway with big passage flow. In order to avoid the targets' inter-shading issue of eyelevel shooting, it should use single camera and shoot perpendicularly. As illustrated in Fig.2, this shooting could get picture characteristic obviously, distinguish the head and body skeleton and avoid the targets' inter-shading issue effectively.

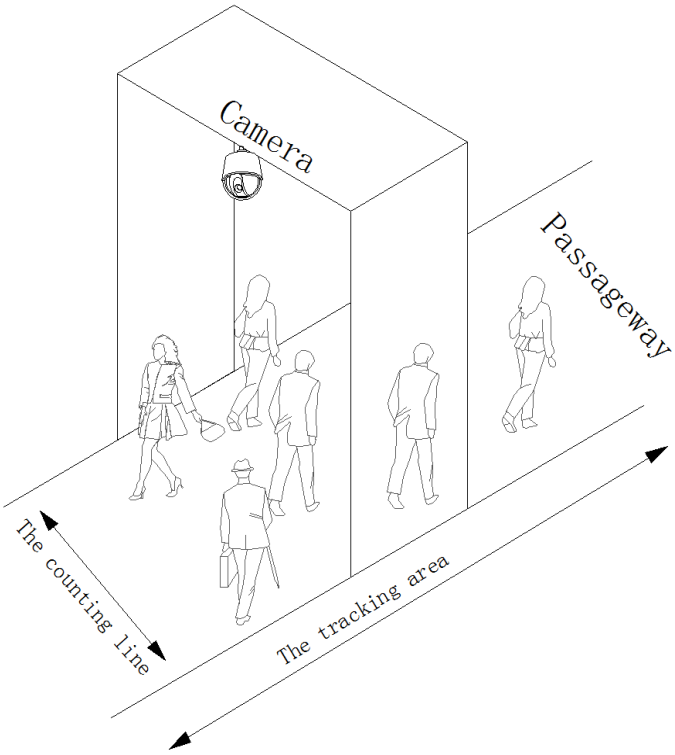

Figure 2: Population Statistics System

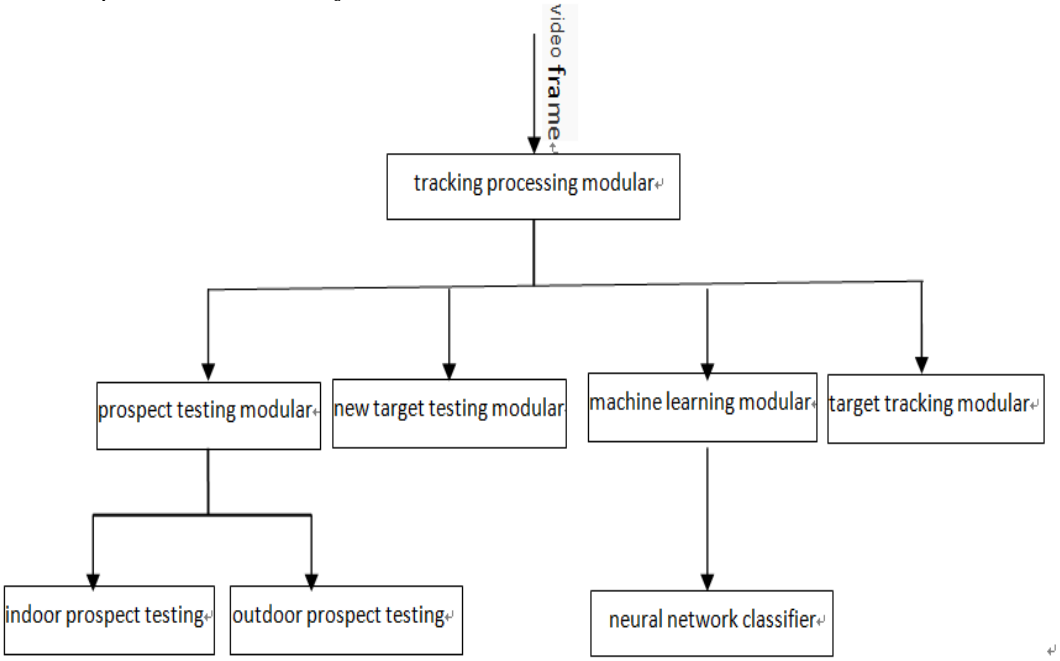

Figure 3: The Front Structure of Statistical System

The middle line in the Fig. 2 is the technique line, which will determine the target's travel direction and account when people pass this line.

3.1.1 Individual Function of the Sub-modular

According to the modular's functions, the system is combined by the prospect testing modular, the new target testing modular, the target tracking modular and the machine learning modular. As illustrated in Fig.3, their functions are as follows:

1 Prospect testing modular: it is used to attribute individual image element to foreground or background, separate the moving objective from the background image and input the foreground mask code. [6]

2 New target testing modular: according to the foreground code input by the prospect testing modular and the tracked target linked list, this modular picks up the new moving target by using the unitary moving of the linked area and filtering the irregular mass. [7]

3 Machine learning modular: this modular aims at the classifers that need to be identified, and make the classifiers to classify the input objectives while improving the veracity and accuracy of the system. The classifier is also able to exclude the interferent and simultaneously count the heads of the multiple and parallel passing situation by application of the neural network classifier. After the new target linked list input by new target testing modular passing the test, it would exclude the non-human body interferent and count heads of the individual target mass. [8]

Target tracking modular: this modular is initialized by the new target linked list which has been processed by the machine learning modular. It provides constant track to the extractive objective by the following algorithm and obtains the target's movement locus. [9]

3.1.2 Target Recognition Process

As illustrated in Fig. 4, the whole system operation process is as follows: firstly, the video frame collected by image collection modular is sent to the prospect testing modular where the movement objective is picked up. It also detects the new movement target via new target testing modular and extracts the eigenvector in the target area. After that, it uploads the information of distinguished human bodies as well as contained target number of this specific moving area as judged and picked up by network. Finally, with the target track modular, the system counts the locomotor human target to accurately judge the direction of the human body's travel and avoid repeated counting for the same objective.

The practical result is showed as Fig. 5.

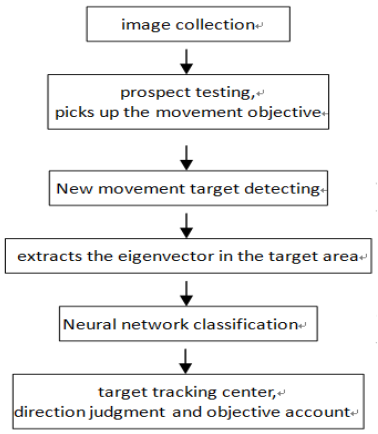

Figure 4: The System Flow Chart

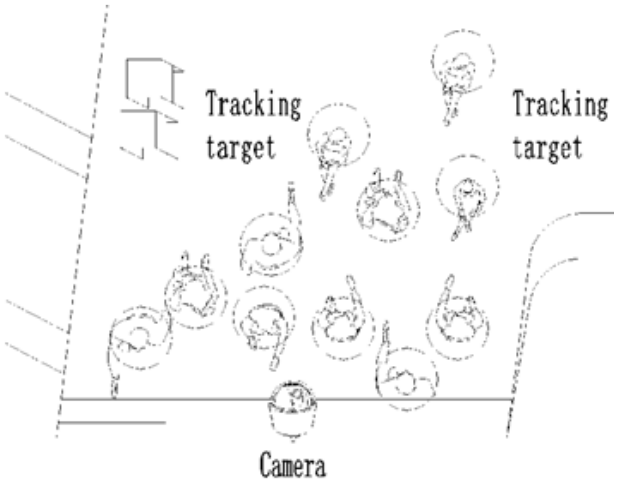

Figure 5: The Practical Application Effect

3.2 Local Area Network (LAN) Server

This server is used for controlling the group counting processing unit. For example, in a city's community which contains lots of residential buildings, the LAN server is needed if every residential building has been set up the camera and demographic processing unit. Main functions of the LAN server are 1) setting up or withdraw the connection with inferior processing unit, 2) setting up the individual camera's counting region and direction as well as working out the local statistical result, 3) providing local database management, local inquiry report service and user's authority management. The provided statistics include single gate real-time in-and-out target account, single gate in-and- out target total account, single gate timesharing in-and-out target account and inquiry, summarizing all gates account result and calculating the regional real-time in-and –out number.

3.3 Integrated Management Platform

This platform could link all sub-LAN servers, collect all LAN server data and video picture, data and statistic, analyze and support remote client report inquiry.

Every city should set an integrated management platform to show the city's all the LAN servers distribution on the map so that the users could review the headcount real-timely by clicking the chosen building and also view the data in the special level or area of the building or in the selected area.

For the platform's functions, it can review the headcount real-timely and timesharing in-and-out number in the selected area, alarm when the population achieves the specific limit, get linked with the map and count up the number of people in the special area as delimitated by the mouse.

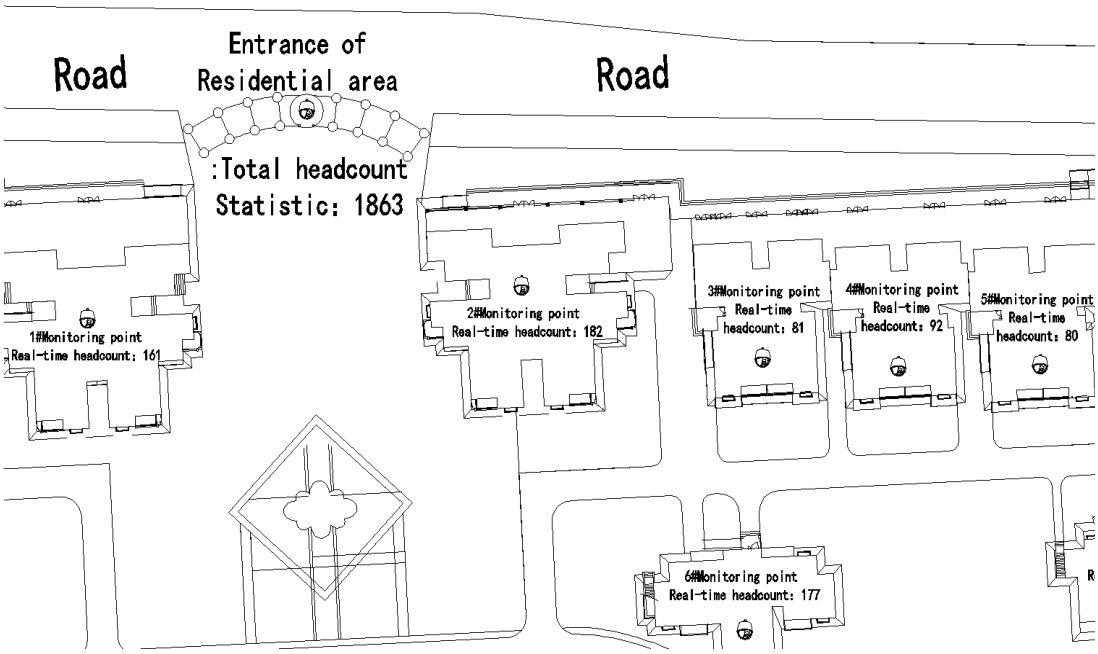

Figure 6: The Real-Time Map

3.4 Remote Controlling Client

The remote controlling client is based on wechat platform. Clients could pay attention via wechat and login the system anywhere. They can also obtain services of the enquiry, report, statistic, analysis and spot situation review conveniently and quickly via the integrated management platform.

4. Conclusion

This intelligent regional demographic statistical system is a development and upgrade of the combinative applications on the basis of cloud and imagine recognition technology. According to the video test information from the high-definition camera, this system is able to analyze the headcount information accurately in the specific zone by computer software. It can also combine the video data to provide the real-time point video information to the client and provide strong evidences of scientific management to other business management software application and function at other applications such as school, shopping center and enterprise. In this sense, it would be widely used in the future.

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