Modern Applied Science
www.ccsenet.org/journal.html
Vol. 3, No. 4
April 2009

Study on the Intelligent Video Monitoring Technology and Its Applications

Yi Wang
China Criminal Police University, Shenyang 110035, China
Tel: 86-24-8678-8898 E-mail: wangyi1513@yahoo.com.cn

Abstract

The intelligence, the digitization and the networking are the necessary trend for the development of the video monitoring technology, and the occurrence of the intelligent video monitor is the direct embodiment of this trend. The intelligent video monitoring equipment possesses stronger image processing ability and more intelligent factors than common network video monitoring equipment, and it can provide more super video analysis functions for users, and it can largely enhance the ability of the video monitoring system and makes the video resources exert stronger functions.

Keywords: Video monitoring, Intelligent, Digitization, Networking

For about twenty years, the video monitoring system has experienced three stages from the first generated a hundred percent analog system, i.e. the video cassette recorder (VCR), to the second generated partial digital system, i.e. the digital video recording/ network video recorder (DVR/NVR), and to the third generated complete digital system, i.e. the network camera and the video server. In this evolvement process, thought the video monitoring system and equipments were largely enhanced for the functions and performances, but it is still limited by some intrinsic factors which includes onto only human physiological weakness, but the limitations of the functions and performances in the video monitoring system and equipment. These limited factors make various video monitoring systems have many deficiencies such as the bad alarming precision, the misinformation and report failure, long alarming response time and difficult video data analysis more or less, so the security and the practicability of the whole system will be reduced.

In recent years, with the quick enhancement of the network bandwidth, the computer processing ability and the memory capacity, the occurrence of various video information processing technologies, the advantages of the digital and networking video monitoring system are more and more obvious, and its highly opening, integration and flexibility create necessary conditions for the enhancement of the whole performance of the video monitoring system and equipment, and offer more abroad development space for the development of the whole security and protection industry. The new application mode and the market opportunities continually occur, and the intelligent video monitoring technology is one of the most popular applications modes in the networking video monitoring domain.

1. The concept of the intelligent video

The intelligent video (IV) is from the computer vision (CV) technology which is one of branch of the artificial intelligent (AI) research, and CV can establish the mapping relation between the image and the image description and make the computer to understand the contents in the video image through the digital image processing and analysis. The IV in the video monitoring technology mainly means “automatically analyzing and abstracting the key information in the video resources”. If the camera is taken as human eyes, the intelligent video system or equipment is human brain. In virtue of strong data processing function of the computer, the intelligent video technology analyzes the large numbers of data in the video pictures with high speed, filtrate the information which users don’t care about, and only offer useful key information for the supervisor.

The intelligent video monitoring takes the digitization and networking video monitoring as the base, but it is different with general networking video monitoring, and it is a sort of more super video monitoring application. The intelligent video monitoring system can identify different objects, find the abnormal circumstances in the supervising pictures, and emit alarms and offer useful information by the quickest and optimal mode to assist security personnel to deal with the crisis more effectively and reduce the misinformation and report failures to the largest extents. In the day that the world anti-terrorist battle is more and more drastic, the intelligent video monitoring obviously can be the powerful assistant tool to reply the terrorist attack and deal with the emergencies. In addition, the intelligent video monitoring technology can also been applied in many non-security relative situations such as the traffic management, the client behavior analysis and the client service to enhance users’ investment returns.

2. The advantages of the intelligent video

The intelligent video monitoring is based on the general networking video monitoring, and except for the advantages of the networking video monitoring, the intelligent video monitoring system can bring more benefits for users as follows.

(1) 24 x 7 hours reliable monitoring. The intelligent video monitoring will fully change the past mode that the monitoring pictures are supervised and analyzed by the security personnel, and it persistently analyze the monitored pictured through the intelligent video module embedded in the front end equipment (the networking camera or the video server).

(2) Largely enhancing the alarming precision. The front end equipment (the networking camera or the video server) can integrate powerful image processing ability, run the super intelligent algorithm, make users more exactly define the characters of the security threats, reduce the misinformation and the report failures effectively, and decrease the useless data.

(3) Largely enhancing the response speed. The intelligent video monitoring can identify suspicious activities (for example, someone leaves suspicious objects in public places, or someone stays too long in the sensitive region), and reminder security personnel to notice the relative supervision pictures to prepare before the security threat happens, and it can also make users more exactly define the special security threat and adopt proper actions, and ensure the crisis processing approaches could be exerted exactly accruing to the plan, and effectively prevent the delays induced by the man-made factors in the confusion.

(4) Effectively extending the purposes of the video resource. The intelligent video monitoring can apply the video resource into the non-security domains, for example, the monitoring system in the main foyer of the marketplace can be used to automatically identify VIP users' characters, and inform client service personnel to make services in time, and when it finds some one slips up, it will inform of relative personnel to offer helps. In addition, the intelligent video system can help the boss of the retail store to count the consumer quantity in the present day, which can be used to analyze the sales goods for the store.

3. The main potential applications of the intelligent video

The application of the intelligent video can be divided into two sorts, i.e. the security correlative application and the non-security correlative application. The correlative application of the security mainly means the intelligent video application in the present market, and especially after "Sep. 11" attack, Madrid explosion and London explosion, the demands about this sort continually increase. This sort of application is mainly used to enhance the security and protection of the public environment in the large outside region for the government or the security department in other institutions. And this sort of application mainly includes the advanced VMD, motion tracking, facial detection, vehicle identification and object persistence.

The memory structure to monitor the host computer applied in the financial monitoring industry all uses the IDE and PCI bus to complete the hard disk control and extension because of the costs whether for the embedded project or the industrial control project. According to the hard disk address order, the monitoring computer marks out the logic drive letter, and the image data are written into the hard disk accruing to the drive letter sequence. Because the video data are written in the whole day, so the higher data written in and index pressures exist in the certain period for each hard disk. At the same time, the DVR hard disk is installed densely, and the heat dispersion is difficult, so the failures of the hard disk and the data loss often happen. In addition, for the management of the memory data, there are two reasons which may induce the data loss, first, because the monitoring host computers are all in the bank branches, the failures of the equipment can not be found in time, and the data will be loss when inquiring, second, the data loss will occur because of the reasons in the management, for example, the data memory and the host computer are in the locale, the failure of the equipment can not be found in time and the data can not be found, or in the interior management, the system doesn't be exerted strictly, and outlaws find the opportunity given by to stop the system or randomly delete the data.

Aiming at above problems, the solution is to copy the video data off site. In the financial industry network system solution, Tianjin Tiandiweiye Co. Ltd put forward to utilize the bank network and the memory software to implement the data off-site memory in the management center with the professional network memory equipment, which can ensure the security of data, and ensure that the corresponding image can be found when problems occur. At present, there are two solutions for the center off-site data memory, and one solution is that because the network in the bank branch is very busy in the daytime, the data is stored in the locale, and copied to the center memory equipment by the network bandwidth in the night, and the second solution is to plan certain network bandwidth for the data transfer in the bank branch, and make the image could be copied to the superior data center timely. Because the networks of the bank branches have been updated to the E1 line or the network environment with wider bandwidth in recent years, the center off-site data memory project becomes possible, and the bank can select the solution to fulfill the monitoring demands according to the network environment and business characters.

Except for the security correlative application, the intelligent video is also applied in some non-security correlative

applications. These applications mainly face to the industrials such as retail and service, and the intelligent video is looked as the assistance tool for the management and service to enhance the service level and the turnover. These applications mainly include people counting, flow control, attention control and traffic flow control.

4. The survey of foreign and domestic intelligent video markets

Form the demands of the market, with the increasingly drastic anti-terrorist situation, the intelligent video monitoring system is more and more concerned by people, and its demands continually increase. As a whole, the foreign intelligent video application market is transforming from the "concept validation" to the "scale application", and the intelligent video has been forming an industry.

Since the concept model of the intelligent video application occurred shortly, some foreign companies begun to research relative software and hardware products. For example, the global leading manufacture of the networking video market, Swedish Axis Network Communication Co. Ltd had pushed the intelligent video products including AXIS242SIV video server and AXIS IVM120 people counting intelligent video application module. AXIS242SIV integrates special DSP chip (TIDM642), and it possesses powerful image processing ability and it can support the running and the development of the third party application software module. The AXIS IVM120 people counting intelligent video application module can automatically count the amount of the people who enter in or go out the special region through analyzing the monitoring pictures by the video monitoring equipment, and the function can effectively help the managers in many industries such as the service and retail to analyze the operation or enhance the service quality. AXIS also planed to push more intelligent video application modules including the vehicle plate recognition and object persistence.

The domestic intelligent video market still has large difference comparing with foreign market, and it is still in the blank status at present. The "intelligent video monitoring" in the monitoring system is actually staying in the concept of the common network video monitoring (IP monitoring, digital monitoring). Along with the application demands of the intelligent video in the market like foreign market, some domestic manufactures have begun to introduce intelligent video software and hardware products and technologies made by foreign famous manufactures, and planed to push them by the form of OEM.

5. Conclusions

The intelligence, the digitization and the networking are the necessary trend for the development of the video monitoring technology, and the occurrence of the intelligent video monitor is the direct embodiment of this trend. The intelligent video monitoring equipment possesses stronger image processing ability and more intelligent factors than common network video monitoring equipment, and it can provide more super video analysis functions for users, and it can largely enhance the ability of the video monitoring system and makes the video resources exert stronger functions. To push the development of the intelligent video industry and achieve the multiple-win effect, all participators including the monitoring equipment hardware supplier, the intelligent video software supplier, the distributors, the dealers and the system integrators should be reasonably organized to make them fully exert their own advantages and create the comprehensive solution which can fulfill users' final demands.

References

Qi, Mo. (2005). *Digital Communication Base.* China Machine Press.

Shen, Yuehong. (2004). *Communication Theory.* China Machine Press.

The Bureau of Science and Technology of Chinese Ministry of Public Security. (2003). *Compilation of Social Public Security Standards.* China Standards Publishing House.

The Compiling Committee of Chinese Ministry of Public Security. (2004). *Security and Protection Technology.* China People's Public Security University.

Wang, Qingyou. (2000). *CCD Application Technology.* Tianjin University Press.