Intelligent Video and Image Cloud Operation Monitoring Center

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Abstract. Based on the PaaS layer in cloud computing, this paper designs and implements an intensive and intelligent video surveillance center. PaaS is based on the public security network and video private network, and provides users with a variety of video operation monitoring services in the form of web. The monitoring center will be able to integrate existing, discrete infrastructure resources to provide core algorithm components, monitoring operators, databases, middleware services, technical services and business services for public security video operation and management applications in a platform manner. Upper-level applications and core users can easily interact with the video operation monitoring module through this platform.

Keywords: Monitoring Center, Cloud Computing, PaaS

In recent years, with the development of Internet of things, cloud computing, huge data, artificial intelligence and other emerging technologies in the field of public security video monitoring, an intelligent, easy-to-use, safe and reliable public security video image information application system has been gradually constructed. The application of video image information is changing from visible and clear to intelligent application mode which can understand and thought completely. How to improve the intelligent perception of the operation situation of the front-end camera and improve the fine operation monitoring management level has become an important topic in the video frontier [2]. Through the construction of intelligent operation monitoring management, the construction of front-end point positions, optimization of point layout, cascade and sharing of data on demand provide effective data support for social and public security, and promote the construction of a higher level of safe China.

1. Researching Background
The public security video image information application system has the following main characteristics. First, the video front-end sensing equipment evolves from traditional single information acquisition mode to extensive intelligent acquisition. Second, video and image data are transformed from unstructured information to structured data, and the data processing method is developed from single perception data to data governance and fusion analysis. Thirdly, the application of video image data has been deepened from simple reading and viewing to intelligent collaborative research and analysis.
Fourth, video operation and maintenance enhances from a single system simple maintenance to systematic security controllable.

Based on the demand of video application system in the new era, the intelligent video operation monitoring center based on PAAS integrates all kinds of original monitoring platforms and monitoring operators to build a comprehensive monitoring and monitoring platform, which supports intelligent application of video images as the goal, and takes the refinement and management of video images and other perceptual data as the core, aiming at the application difficulties of each part, "Front end, network, platform, data, application, user, boundary" and other dimensions design and deploy monitoring means to build a comprehensive and integrated operation and maintenance system to ensure the efficient operation of video image applications and timely disposal of faults.

2. Research and Design of Monitoring Center

Platform as a service (PAAS) is a common cloud computing model. Its main advantage is that it can distribute operators on computers [1] in a distributed way. All kinds of basic software running on PAAS platform can obtain computing resources, memory and various platform services according to the needs. PAAS can dynamically allocate resources and is easy to expand. It is a necessary technical way to build the central monitoring platform [3]. The realization of monitoring center mainly includes four parts: PAAS basic platform, application service layer, display layer and external interface. Overall structure of monitoring center Figure.1

![Overall structure picture of monitoring center](image)

**Figure 1.** Overall structure picture of monitoring center

2.1 Basic Cloud Platform

PAAS basic platform includes application deployment management, resource scheduling and load balancing, various application calculation modules (such as calculation module of video quality diagnosis, calculation module of data quality analysis), basic resource module (such as graph database, structured and unstructured database), and service interface set. PAAS infrastructure platform structure as Fig. 2

![PAAS infrastructure platform structure](image)

**Figure 2.** PAAS infrastructure platform structure

Application Deployment Management. The main function of this module is to package application packages published on this platform into packages that can be deployed and published. After
packaging, the application will be published in the relevant container for deployment. Application deployment management is the core function of PAAS basic platform, which needs to support multiple languages and frameworks [4-6].

Resource dispatch and load balancing. The main function of this module is to map the resources requested by the application to the relevant server instance, and provide the functions of dynamic registration, real-time scheduling and load balancing.

Various application calculation modules. This module is mainly used to manage the most resources of the calculation module used in the upper layer monitoring, which is convenient for multiple application monitoring functions to call various calculation modules for result analysis. The current system mainly includes video quality diagnosis module, data quality analysis module, face recognition quality analysis module and license plate recognition quality analysis module.

Basic resource module. This module is mainly used to provide various basic resources, such as database and middleware.

Service interface set. The main function of this module is to provide interface management for developers and operation and maintenance people, including parameter configuration, application control, release program, system expansion and capacity reduction, and instance creation.

Based on PAAS basic platform, each application instance of monitoring center can easily realize elastic scaling. The design of the basic platform is open and can support a variety of different programming languages, technical frameworks and services. It provides a wide range of choices for the upper application and greatly improves the monitoring efficiency of the platform. At the same time, PAAS basic platform also greatly reduces the operation cost of the monitoring center, which provides the possibility for a wider range of unified monitoring [7-10].

2.2 Application Service Layer
The application service layer of the intelligent video operation monitoring center (monitoring center) realizes the horizontal expansion of the monitoring module, monitoring the operation status of the networking / sharing platform and the analysis platform; supports the governance and specification of various data; supports the IT equipment management and the monitoring of the clock consistency of the whole network. Operation monitoring can be compatible with all kinds of monitoring modules and interfaces to achieve the ability of rapid superposition of monitoring and monitoring indicators.

Application service layer structure diagram as Fig. 3.

![Application service layer structure diagram](image)

**Figure 3.** Application service layer structure diagram

Application module monitoring. The intelligent video monitoring center provides monitoring of more than 20 kinds of video operation fault, and provides alarm based on various faults.

Monitoring implementation.

After the deployment of each monitoring module through application deployment management, the resource dispatch and load balancing module performs the operation and puts the results into storage according to the business demand dispatch application calculation module of the upper monitoring module. Implementation method of monitoring function as Fig. 4
2.3 Presentation Layer and External Interface

(1) Display of operation situation analysis. Through the comprehensive analysis of operation monitoring result data and alarm data, the operation situation evaluation report is generated, and the weak links are early-warning. Automatic comprehensive display of the whole network resource situation, evaluation of equipment operation health. According to the front-end equipment construction area, application effect and other types, display the operation situation, network topology and operation situation. The real-time monitoring results and faults are statistically analyzed, and the operation situation analysis report is generated. Conduct comprehensive analysis on the whole process of operation and maintenance, and then generate operation and maintenance huge data analysis report.

(2) Performance appraisal display. Through the comprehensive statistical analysis of front-end, it infrastructure, data and other aspects of operation and maintenance data, the comprehensive evaluation of construction, application, management and maintenance is realized, and the results are displayed in the form of reports.

External interface. The external interface mainly realizes the unified interactive interface service with front-end camera, monitoring platform and other sensing equipment, operation and maintenance platform and business system as well as upper and lower platform.

3. Application and Results
The intelligent video operation monitoring center based on PAAS plays an important role in the public security video operation and maintenance system. The monitoring center can connect with the technical requirements for information transmission, and exchange and control of security video monitoring networking system (GB / t28181-2016), monitor the online status of the networking / sharing platform, the number of networking devices, the online rate and integrity rate of equipment, and the accuracy rate of one machine and one file GIS, so as to ensure the ability of video networking and real-time reading. For the fault equipment, the alarm information is generated in time and sent to the comprehensive alarm station to judge the fault cause and send out alarm notice. At the same time, the monitoring center also supports the public security video image information application system (GA)_ T 1400-2017) standard access, through the analysis of port equipment information and interface data volume, to achieve the monitoring of bayonet basic information, bayonet online rate, data standard rate, acquisition stability and other performance. After data collection, comprehensive
research and judgment generates operation situation analysis. Operation situation analysis page as Fig.5

![Figure 5. Operation situation analysis page](image)

4. Conclusions
The intelligent video operation monitoring center based on PAAS establishes a unified index monitoring system for the whole network. Each business system and operation and maintenance system monitor the operation status of the business system according to the same method to ensure the consistency of the evaluation system. The monitoring center is based on meeting the actual management needs of daily operation monitoring management after the completion and use of video monitoring system, and the main goal is to comprehensively improve the comprehensive utilization rate of resources, so as to realize the centralized monitoring, centralized display, centralized maintenance, centralized assessment and statistics of the network equipment "all-weather, all process, and all-round", so as to ensure that the video technology of public security can play the maximum benefit. Besides, to establish and improve the operation and maintenance management body which can effectively guarantee the high availability of video monitoring system.

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