Retraction Notice

The Editor-in-Chief and the publisher have retracted this article, which was submitted as part of a guest-edited special section. An investigation uncovered evidence of systematic manipulation of the publication process, including compromised peer review. The Editor and publisher no longer have confidence in the results and conclusions of the article.

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Role of video sensors in observing visual image design in the construction of smart cities

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Abstract. Due to the advancement of software and hardware technologies such as geographic information systems, for example, optical fiber storage, mobile network, digital camera, and high-definition network, it has promoted the establishment of a data digital management system. Network sharing, to a certain extent, makes it the smart city video sensor of today's era. It is a key component of the city's smart management system. In the context of the rapid development of the information age, I explore the role of video sensors in the visual design of smart cities. I propose three methods to analyze the theory of big data video sensors: theoretical analysis of big data video sensors, information visualization, and visual signal output, and then model the video signal output to visualize the complex multilayer network decision. Starting from the RBF neural network, I simulate a video perception prediction model system, import the data into Matlab for experimental analysis and simulation, and compare RBF and BP are based on both data predictions. RBF obviously has stronger predictive video perception. Experimental data show that the error between video perception and actual data is within 3%. It can be seen that video sensors play a key role in the construction of smart cities. © *2022 SPIE and IS&T* [DOI: 10.1117/1.JEI.31.5.051406]

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1 Introduction

Digitization and intelligence are the direction of urban transformation and development, and the government is shifting from a category-based approach to a service-based approach. Smart cities can be used to support government change and use cutting-edge technology to extend services to millions of households. The video captures information about urban traffic, safety, and environmental protection. The centralized video image analysis and big data analysis of video image data help provide information to support city management and provide a solid foundation for government decision-making. The construction of wisdom of the city cannot be separated from the help of visual design. On the one hand, it can reflect the characteristics of the city. On the other hand, the development of visual design provides a guarantee for the establishment of the image.

With unique resource advantages, many industries and departments, such as transportation, public security, education, and justice, actively promote the application of big data video technology to build a smart city in Yichang. To further build the social aesthetic education, this is inseparable from the beautification of the city. It is the study of social aesthetics. Through research and analysis of the relationship between contemporary urban design and social aesthetics, we can understand all aspects of the city from one side, understand China and the United States, and fascinatingly study the pleasure of aesthetics to create beauty. On the other hand, we can understand that the lack of urban imagery in contemporary China provides urban builders with a theoretical basis for planning. The research on this subject provides theoretical research on social aesthetics and serves as a guide for contemporary visual design. And being able to publish a master's thesis on the subject of academic and innovative research has certain practical value, which allows urban builders and designers to have a more systematic and

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comprehensive understanding of visual design and create a comfortable and poetic environment for the public.

Visual images have no boundaries, and good visual communication design overcomes language, geographic, and cultural barriers. This is a special form of language, such as navigation maps, traffic signs, and no smoking signs. With this logo, people of different nationalities, different languages, and different cultures are connected together. As well as the faster and more efficient dissemination of information and emotions, Payne et al. proposed the relevant role of image visualization in the construction of smart cities. They used several developed cities, such as Shanghai, Shenzhen, and Nanjing, as examples to simulate the visual design of urban construction effect. But for the rapid development of information technology, this view is not enough to fit the actual social development.[1] Eriksson et al. differ from the viewpoint of technology in the field of philosophy of science and technology. The effect of the new perception system on the construction of smart cities is proposed. Through the predesign modeling and the final experimental simulation, the application program can effectively simulate. However, the current situation of smart city construction in my country and the existing problems, methods, and theories have not been well implemented.[2] Hu et al. believe that all morphological elements of the city are an integral part of the visual recognition system. Instead, they delved into and discussed the creative areas that best express the influence of city brands. Its innovation is to adopt modern corporate brands, guide, and learn from the company. The essence of the CIS principle explains the creation of a unique system for identifying city images. It also introduces the VI business strategy to enhance the overall image of the city, but its research theory has not been implemented in most cities.[3]

This article is suitable for situations where the amount of structured or semistructured data is large, depending on the context of the rapidly changing information age. The big data platform is the supporting platform of the application platform. The ability to efficiently process big data applications can efficiently store, retrieve (secondary), analyze, and statistical data through the big data platform. Based on these data, this article will develop these data into an integral part of urban culture. The tradition of the city is the rush of history and culture, and it also captures the characteristics of the development of modern cities. Therefore, it is necessary to combine communication design with images to create a characteristic urban culture and show the city's style.

2 Theoretical Analysis of the Image Design of Smart Cities

2.1 *Theoretical Analysis of Big Data Video Sensors*

It is suitable for situations where the amount of structured or semistructured data is particularly large. The big data platform will serve as a supporting platform for the application platform and provide powerful big data processing capabilities. With the help of a big data platform, applications can efficiently store, retrieve (second layer), analyze, and quantify them. Big video platforms are usually built as distributed clusters to improve performance and optimize user experience. The cluster can balance the processing load. At the same time, the cluster is easy to expand. And the overall platform performance can be improved by adding cluster nodes. When storing data, the following points should be considered: (1) what data should be recorded by the big data video platform, and (2) how to deal with the information that already exists in the existing system. (3) How to ensure the accuracy of gender information, the big data video platform uses distributed computing, combined with accelerated memory load balancing and internal processing, it has the ability to efficiently process information. The large video processing system adopts a distributed storage method to solve the storage problem of massive processing videos, which improves the speed of reading and writing, and increases the storage capacity to solve the processing problems when processing large video data. Use distributed computing technology to improve your analysis and data mining capabilities. The general architecture of a large-scale video processing system is shown in the figure below. It includes three aspects, namely the platform layer, the application layer and the resource layer. The resource layer includes basic computing resources, information resources, video resources, etc. This layer can create, store and process large amounts of data resources, such as driving data, vehicle, personnel, and event data.[4,5] Platform level: big data video platform, the status of the large video data

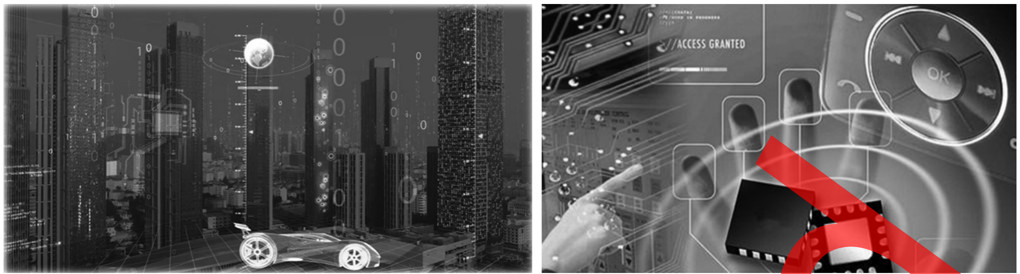

Fig. 1 Map of smart city.

platform, including processing and storing information, data migration, cluster management, and other functions, with an extended application interface, similar to a database. But the processing power is much higher than the database, and it can handle the big data application layer: based on the efficient data services provided by the big data platform, industry application platforms (public safety, transportation, justice, energy, and education) can provide users with storage, search, and analysis. Big data functions, such as, statistics, are shown in Fig. 1.

At present, the video perception system is already one of the important components of the smart city management system. There are four major elements of video surveillance: video capture, video processing, video transmission, and video storage. The basic workflow of video processing video transmission and video capture is as follows. The video capture operation is to use a camera to collect geographic data and send it to a data processor through a USB interface. The data processor performs data processing, such as transcoding the collected video data using encryption, compression, and filtering techniques. We use mobile network technology to encapsulate the processed data into data packets to send. Also, people can obtain processed video data by decoding the data equipment.[6,7] Video big data technology can quickly obtain applicable and valuable information from a large number of unstructured video data of various types, so as to meet the needs of enterprises and users. The realization of this function requires the help of video big data platform technology, which is usually constructed in a structured distributed cluster mode. From bottom to top, there are three levels: resource layer, platform layer, and application layer. Figure 2 shows the video surveillance process in smart city management.

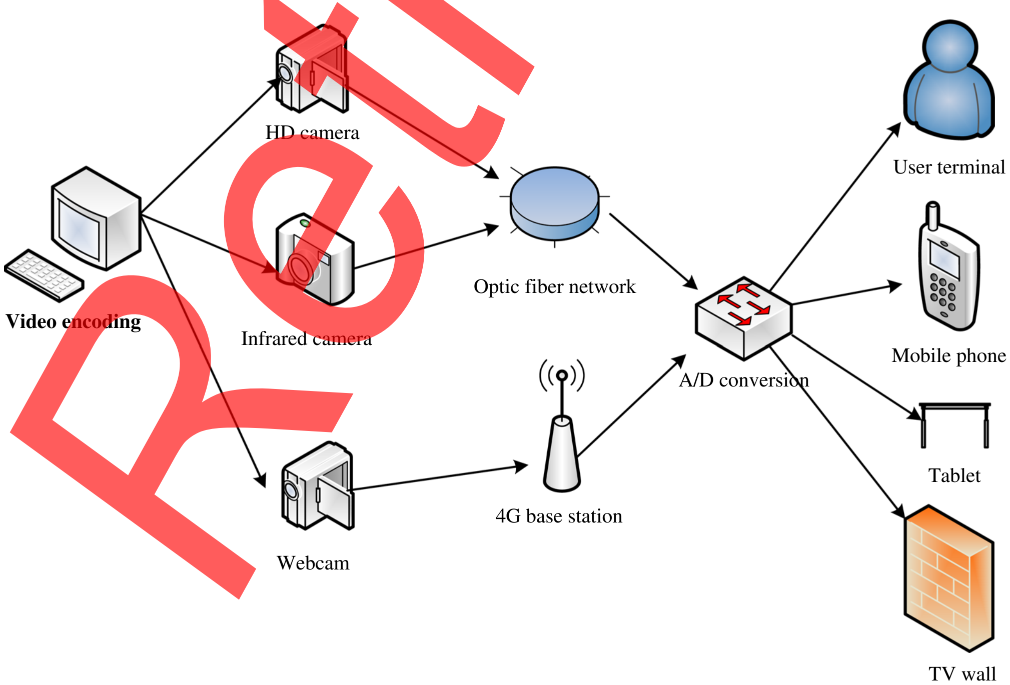

Fig. 2 Video surveillance system composition and workflow.

Pattern matching is one of the most common basic pattern recognition algorithms. This refers to the alignment of two images. Image matching technology for the same target (or multiple images) in space is widely used in navigation, aerospace technology, and other industries and fields. Common gray-scale image matching methods such as target recognition and scene intrusion include gray-scale matching methods and feature-based matching methods. Gray matching methods are generally point-to-point matching, so the relative accuracy is relatively high, and it is very sensitive to changes in interference. When the external light changes, the test results will be affected.[8] The maximum matching algorithm mainly includes forward maximum matching algorithm, reverse maximum matching algorithm, two-way matching algorithm, and so on. The main principle is to segment a single character string and compare it with the thesaurus. If it is a word, record it. Otherwise, by adding or subtracting a word, continue the comparison, and there is still one word left. If the string cannot be divided, it will be treated as unregistered. At the same time, it is very complicated from a computational point of view, and rotation, deformation, and occlusion are all subtle. The selected attributes include points, lines, borders, textures, etc. Resist external light changes by isolating certain characteristics. Scale changes and rotation changes then use these features to match methods and make it very stable. In the coordinate distribution in the image, the first preset the exposure of a coordinate point (x, y) in the image at time t $I(x, y, t)$ so $u(x, y)$ and $v(x, y)$ can be regarded as points (x, y) when the motion decomposition vectors in the x and y axis directions are decomposed, respectively. In a very short time differential dt, the point (x, y) is shifted to the pixel coordinate $(x + dx, y + dy)$ and $dx = udt, dy = vdt$, which represents the relationship between the spatial gray scale of the image and the optical flow velocity.[9,10] Table 1 is a list of parameters taken under different video sensors under the matching method.

In the optical flow constraint equation, both u and v are unknown. And there is only one constraint equation, so the luminous flux cannot be uniquely determined. Other constraints must be added to define u and v. The introduction of different constraints will lead to different methods of calculating luminous flux.[11] The most classic is the gradient optical flow algorithm, also known as the differentiation method. Most of them are based on the gradient function of the gray image to get the motion vector of each pixel in the image. In the process of image template matching, due to some perspective distortions between the image to be matched and the template image, there are some partial and complete nonmatching phenomena. How to filter out these situations, and how to measure the difference between the image to be detected and the template is a problem that needs to be solved at present. The similarity of Ref. 12, the distance matrix D is

$$Q = q_1, q_2, \ldots, q_n, \tag{1}$$

$$C = c_1, c_2, \ldots, c_n, \tag{2}$$

$$D = \begin{matrix} d(q_1, c_1) & d(q_1, c_2), \ldots, & d(q_1, c_n) \\ d(q_2, c_1) & d(q_2, c_2), \ldots, & d(q_2, c_n) \\ d(q_n, c_1) & d(q_n, c_2), \ldots, & d(q_n, c_n) \end{matrix}. \tag{3}$$

The path of the curve is defined as: at two distances of different time series D, the path of curve W is defined as a series of continuous matrix elements with different relationships between time series:

$$W = \{w_1, w_2, \ldots, w_n\}. \tag{4}$$

Table 1 Comparison of detection at different width thresholds.

Width threshold	Fixed threshold (5 pixels)	Template width of 1/3	Template width of 1/2	Template width 2/3
Foreign body (<= 2 cm)	1203	1255	1321	1422
Foreign body (2 to 8 cm)	1520	1621	1425	1236
Foreign body (>8 cm)	1868	1896	1758	1851

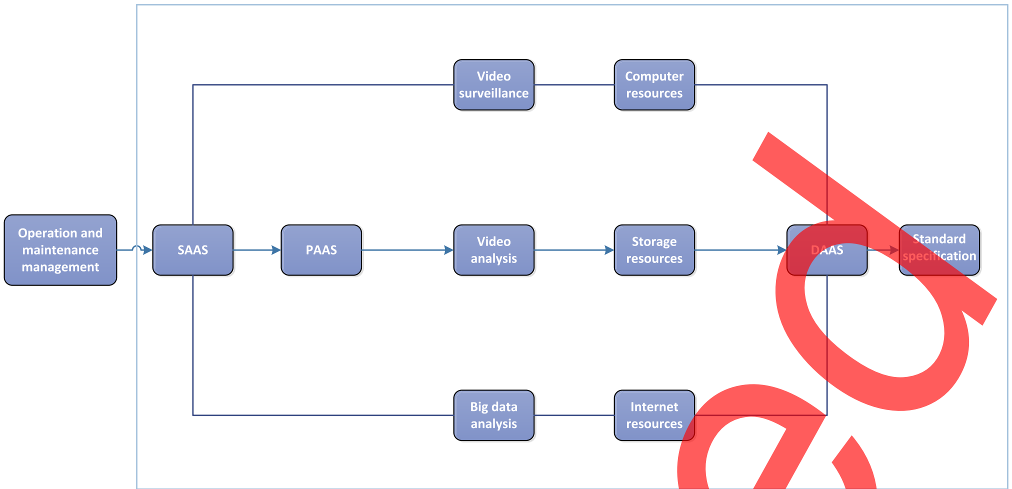

Fig. 3 Smart city video cloud architecture diagram.

The curved path satisfies the following constraints:

(1) Bounded

$$\mathrm{Max}(m, n) \leq k \leq m + n - 1. \tag{5}$$

(2) Boundary conditions

$$w_1 = D(1, 1), \qquad w_k = D(n, m). \tag{6}$$

(3) Continuity

$$w_1 = D(i, j), w_{k-1} = D(O, P), \qquad I - O \leq 1, J - P \leq 1, \tag{7}$$

(4) Monotonicity
Not allowed to appear at the same time

$$I - O \leq 1, \qquad J - P \leq 1. \tag{8}$$

Therefore, after the above definition, find the iterative formula of the optimal path.

The system logic design of the smart city is based on the construction of the big data platform, using the intelligent combination of network sharing and video sensing, the designed framework is shown in Fig. 3.

After describing the theoretical analysis of big data video sensors, we need to do a principle analysis of the visualization of information below to make the visual perception of smart cities more intelligent, informatized, and digital.

2.2 Information Visualization

Data visualization is the process by which people use computer technology to represent abstract information and then obtain abstract information. Data visualization technology provides a bridge for researchers, designers, and decision makers to connect and understand abstract data through a visual interface. Cognitive psychology and graphic technology are the basis of visualization technology: cognitive psychology starts with human senses and perception, focusing on how people understand it, accept it, and reflect on visual information. Graphics technology starts from the perspective of computing and technology; pay attention to how to personalize the synthesis and rendering of information images in the data. The visualization reference model is a relatively classic model. As shown in Fig. 4, in a cyclic simulation system, the integrity of the data is filled by the actual and intelligent big data prediction of the data. For data sets with

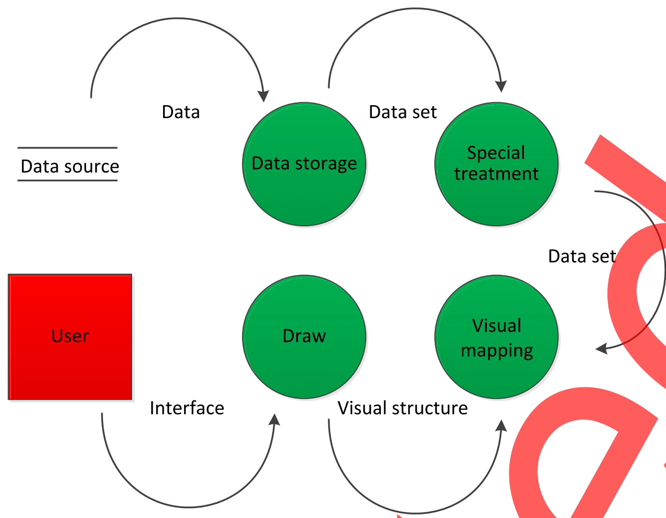

Fig. 4 Classic information visualization process.

abnormal structures, formats and methods such as conversion or conversion of data types are used. For sparse big data, use attribute extraction or dimensionality reduction techniques to remove redundant data.[13,14] Then, use the visualization method to transform, transform the unusable data set into a data structure through a series of differentiation solutions, and use it to present it to people through a series of operations. People can interact with the interface through a series of operations.

There are seven visual data structures in data visualization, as shown in Fig. 5. One-dimensional (1D) data refer to 1D vector data, which is usually stored in linear arrays. Two-dimensional data refer to a data collection with two attributes: two attributes are used to describe a piece of data, such as geocoding data, and longitude and latitude are used to describe location. The data dimension stores data. The other dimension is used to cache large amounts of text or annotations,

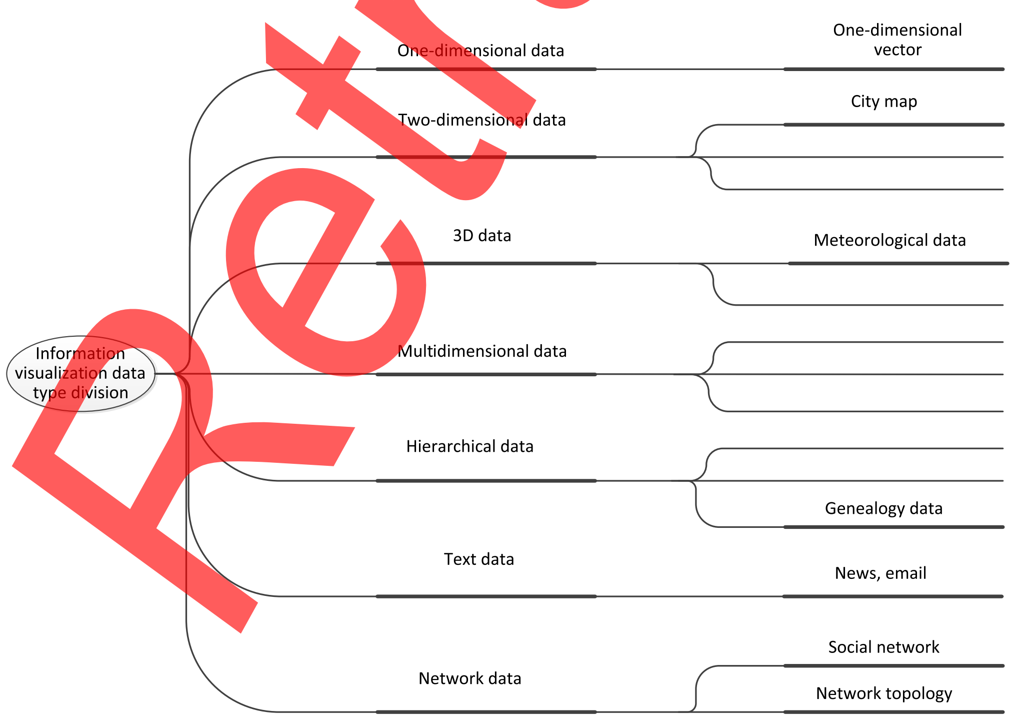

Fig. 5 Classification of classic visualization data types.

such as statistics and frequency. For three-dimensional (3D) data, three change vectors are used to describe the location of its video. A common relational database is a collection of linear data composed of multidimensional attributes.[15,16] The upper and lower levels of the data logical structure will not constitute a cycle, and the persistence and transmission are usually stored in XML files.[17] Video perception information refers to the information obtained during monitoring, and the obtained information will be cached in the hard disk of the computer, so the information structure branches will be summarized into a general information column.

2.3 *Visual Signal Output*

Data visualization aims to present information in a visual form. It is a graphic image that combines information and design. It is a form of information presentation that helps to disseminate information shortly and effectively to users. Therefore, from the perspective of the actual development of the information industry in smart cities, we should proceed from the perspective of graphic design. Visualization is an effective way to solve these problems through visualization, making information more understandable and connecting reality. People use the smart city model to create a true modern lifestyle.[18,19] With the strong development of smart city construction, the rationality of smart city visualization has therefore become a key happiness to enhance user experience. From the perspective of user experience, data visualization is an information phenomenon that exists in other formats. From the abstract to the specific analysis and visualization of currency from a design perspective, the key question is whether it can retain the connotation and essence of the data. It is a way of telling stories, but after analyzing the data and information in a more appropriate way of external expression, the proper dissemination of the information makes the information complex and difficult to understand. At the same time, to make it easier for users to understand the information, in the visual design, the information content is decomposed and translated using graphics, media, and other formats. Perform data-driven visual design in the visual space between the user and the data.[20] Table 2 is the output list of detectable information after signal conversion:

Our lives are surrounded by all kinds of information; some information is correct, and some information is inaccurate. A large amount of data makes people fall into the perception and choice of information. Whether it is visualization, it can effectively help people get rid of communication caused by misinformation. Focus on the hidden content and acceptance to realize the effective dissemination of user information and data. This is a visual design method that redefines visualization. This will give you a design teacher facing the challenge of data,[21,22] so in the question. It needs to be divided into three aspects: (1) data graphical expression, (2) data symbol expression, and (3) data visualization design expression. Before creating a visualization, you need to start with a question and find out what the purpose of the visual design is and what you want to talk about stories, who do you want to tell, and other questions, such as how to present weather changes during the week:

$$\min \|M\alpha - T\|^2 \ \& \ \|\alpha\|^2, \tag{9}$$

where $M = \{MIJ\} = \{G(aj, bj, xj)\}$, $i = 1, \dots, n$, $j = 1, \dots, L, H$ is the output matrix attached to the middle of the airtight layer, and HIJ is the output of the j confined layer node, Xi represents a confined layer node. In Eq. (1), $\alpha = [\alpha_1, \alpha_2, \alpha_L,]T$, $M(xi) = [m_1(x_i), m_2(x_i)]$, $mL(x_i)$, $T = [t_1, t_2, t_n]T$.

Table 2 Comparison of detection of different length thresholds.

Length threshold	Value fixed threshold	Template width	Template width
Small body	Cannot detect	Cannot detect	Cannot detect
Media body	False detection	Can detect	Missed inspection
Huge body	Can detect	Can detect	Can detect

According to the literature, Eq. (1) can be solved by the following equation:

$$\alpha = M^{+}T, \tag{10}$$

where M is the generalized inverse of matrix M. The earliest learning machine principle was to deal with the faults of the feedback neural network of a single airtight layer, but in the later stage, a large number of work-related personnel extended the principle of extreme learning to problems that are not network neural, and thus verified the limit. The applicable conditions of the learning machine are lower than the vector mechanism and the least squares mechanism,[23] and this is the case for the extreme learning machine in this paper.

The main constraint optimization problem of the extreme learning machine is defined as the following equation:

$$\text{minLPELM} = \frac{1}{2}\|\alpha\|^2 + C\frac{1}{2}\sum_{i=1}^{n}\|\gamma_i\|^2. \tag{11}$$

The constraints are

$$h(x_i)\alpha = t_i^T - \gamma_i^T, \qquad i = 1, \ldots, n, \tag{12}$$

where $I = [\gamma i, 1, \gamma i, 2, \ldots, \gamma i, q]T$ is the error of the action collection vector for the sample xi of the q output nodes, and c is the regularization variable. According to the conditions of Kadoyili, the optimization problem encountered can be transformed into the following equation:

$$\alpha = H^T\varphi, \quad \varphi_i = C\gamma_I, \quad h(x_i)\alpha - t_i^T + \gamma_i^T = 0, \quad i = 1, \ldots, n, \tag{13}$$

where T is the Lagrange multiplier matrix. The final output weight α is calculated as the following equation:

$$\alpha = H^T(I/C + HH^T)^{-1}T. \tag{14}$$

Therefore, the output function of the extreme learning machine can be defined as the following equation:

$$f(x_j) = h(x_i)H^T\left(\frac{I}{C} + HH^T\right)^{-1}T, \qquad j = 1, \ldots, n. \tag{15}$$

The extreme learning mechanism and the vector support principle are highly similar, you can convert the above kernel function into the extreme learning machine, and then limit the range of conditions for its function. The limit condition theorem can transform the output into the following equation:

$$f(x_j) = h(x_i)\alpha = [K(x_j, x_i)\ldots K(x_j, x_n)]^T\left(\frac{T}{C} + K\right)^{-1}T, \tag{16}$$

where $j = 1, \ldots n$. After the forwarding simplified processing, the program can classify and quantify the output of the video. The data symbol expression can be flat or 3D, solid or dynamic. The purpose is to make the information clear and concise. And in the process of symbol design, the unique meaning of symbols is used to enhance the charm of graphics. This is mainly a common conversion between symbol language and text language, adding data symbols. Therefore, designing symbols in graphic design is another important factor in data visualization. It is also a way for users to remember things more easily. The specific video parameters of the data set and the scale of the data set are shown in Table 3. Designers need to process large amounts of data in an orderly manner in limited graphics, eliminate visual obstacles caused by text data, and realize that tangible graphics contain intangible resources.[24]

Table 3 Specific parameters of UCF101 data set.

Project	Parameter
Action category	80
Number of videos	13,310
Average video duration	8.21
Total time length	1400 min
Maximum duration	72.5 s
Longest	2.06 s
Frame rate	30 fps
Resolution	320*240

3 Decision Visualization Model Based on Multilayer Heterogeneous Complex Network

3.1 *Model Definition and Design*

Decision-making requires answering questions such as the reason for the action, event, location, and people. Decision models are paradigms, tools, processes, and theories that can reduce uncertainty and produce guidelines. Social dialogue decision visualization is the process of simplifying complex information related to defined decision goals, provide appropriate information to decision makers in an appropriate manner, and help and improve the decision-making process. It is a tool for finding natural knowledge. The visual decision-making model proposed in this paper is the visual decision-making cycle proposed in Ref. 25. It is initially different from decision-making visualization models in other fields. This model hopes to distinguish complex city data. Through data visualization, it provides decision-makers with information visualization related to decision-making. It also provides intelligent support for decision-making.[26,27] The platform decision view management function module system and information management structure should be composed of auxiliary decision makers and decision makers. Deputy decision makers use data and system tools to create visual interfaces for existing systems to facilitate decision making. The role relationship is shown in Fig. 6.

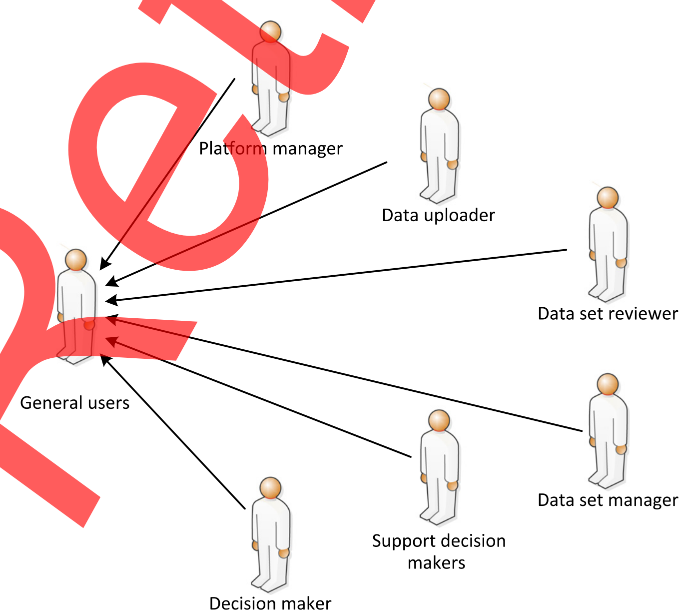

Fig. 6 Use case diagram: role relationship.

3.2 *Model Description*

(1) Build a smart city video application infrastructure, including network resources, computing resources, storage resources, and security resources. (2) Build a video image resource sharing platform. According to national and industry standards and regulations, standardize the collection and format of data, establish an information resource sharing catalog, clarify the data information that relevant units should share, and formulate the exchange principles of various departments on the platform. (3) Build a smart city video service platform. After investigating the video business application requirements of various departments, the integration is divided into general video business and personalized business, and rich business versions are provided at the SAAS layer to meet the needs of each business. (4) Build an external video sharing platform. Utilize the video resources that have been accessed and share them with relevant departments that need video data, which facilitates the linkage of multiple departments and avoids duplication of construction. The decision-making visualization model is based on a complex multilayer network, simulating the decision-making process of transforming data into a visualization. The model entities and the relationship between the entities are shown in Fig. 7.

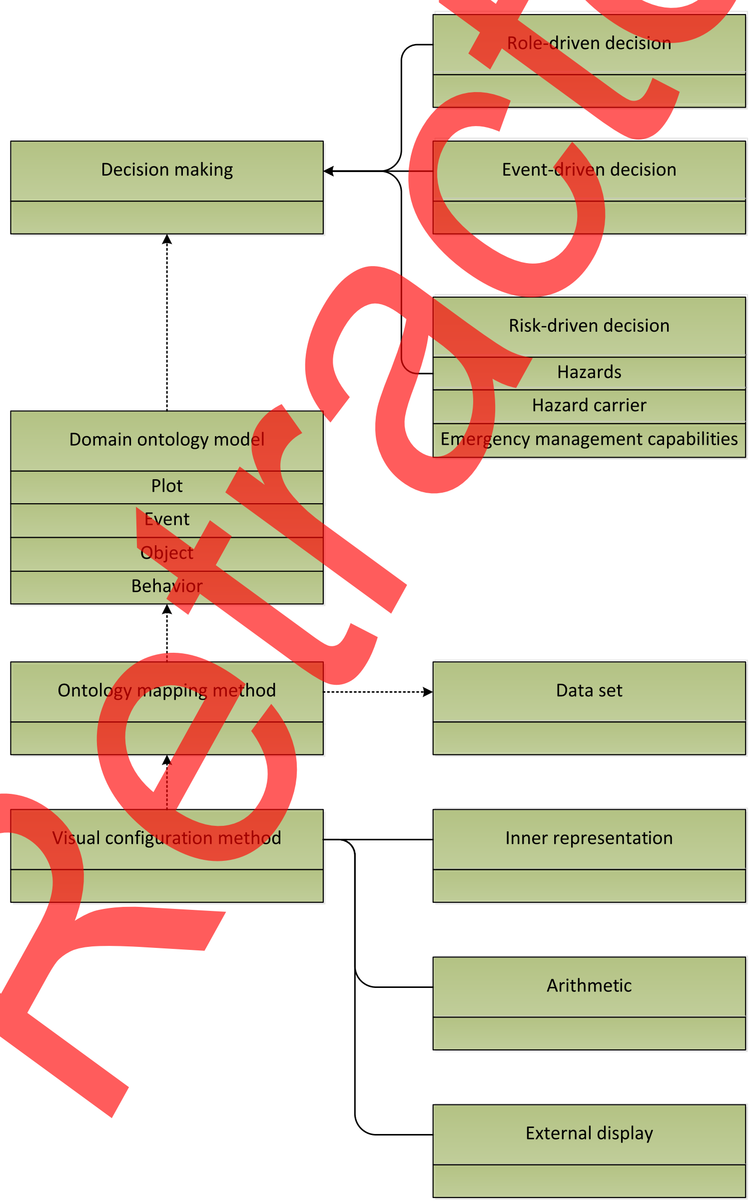

Fig. 7 Decision visualization model.

As shown in the figure above, the models provided in this article are video perception, information integrity supplementary recording, image design, and visual design-related models, which all describe the visual structure in a loop. Decision-making here refers to the subjects and objects participating in the construction and development of smart cities and various activities in the city. The objects mainly include people, organizations, and vehicles. The relationship between people, the interaction between people, the affiliation between people and organizations, the business associations between organizations and people, the cooperation and branch relationships between organizations and organizations, etc. constitute a complex object association network.

3.2.1 *Decision*

Decision-making is the main job of the decision maker and the main goal of the model. The decision-making organization includes the definition of the decision-maker, the definition of the area where the decision-maker is located, and the definition of the decision-making issues that the decision-maker should pay attention to. The definition of the decision-maker specifies the goals of all model services. The definition of the domain where the decision maker is based is to identify the domain based on the model and related information about the domain. The decision maker should focus on defining the decision-making problem and defining the visualization goal. In the context of smart cities, decision-making can be divided into role-based decision-making, event-based decision-making, and risk-based decision-making.[28]

3.2.2 *Role-based decision making*

Role-based decision-making refers to the types of decision-making events driven by decision-makers, the construction of smart cities to maintain the normal operation of the city, the execution of organizational units to perform functions, or the completion of organizational development. Planning, decision-makers conduct decision-making activities, the model mainly focuses on the analysis of issues related to decision-making.

3.2.3 *Event-driven decision making*

Event-driven decision-making refers to making quick and effective decisions to respond to emergencies and reduce losses caused by emergencies. By implementing emergency plans, effective decision-making and rescue operations can reduce losses caused by emergencies. Therefore, event-based decision-making can be divided into emergency response decision-making activities and process decision-making activities.

3.2.4 *Risk-based decision*

Risk-based decision-making refers to the decision-making activities of decision-makers using risk assessment methods to identify the possibility of loss and injury during the creation and development of an organization. Then intervene. Most commonly used risk assessment models are related to hazard factors, hazard vectors, and emergency management capabilities. The ability of disaster service providers to manage emergencies is therefore information that needs to be displayed in risk-based decision-making activities.

3.2.5 *Domain ontology model*

The domain ontology model is an ontology model established to describe the key concepts and relationships in the domain under the constraints of the domain in which decision-making activities occur. The complex network of different levels of "behavior-event-object-behavior" can reflect the relationship between people relationship. The relationship between different data units, in addition to the network relationship within the data entity, adapts to the background of the smart city area. This article will develop the concept of complex multilayer networks at different levels. The domain ontology model is mainly used to organize data entities. In the smart city and the relationship between them, it provides a foundation for the ontology mapping and processing of multiple data sets related to visualization goals and visualization decisions.

3.2.6 *Ontology mapping method*

The ontology mapping method is based on the domain ontology model and designs the ontology concept into an entity table structure. The complex and diverse data sets in smart cities are designed through configuration in the ontology, and entities are defined in the ontology model, and the relationships between entities are processed to make this information useful and relevant.

3.2.7 *Data set*

Existing and readily available groups in the field of smart cities.

3.2.8 *Visual image setting method*

The visualization configuration method is based on the results of the ontology graph and describes the data visualization process for decision makers through configuration. Decision-driven visualization often requires a combination of multiple visualization interfaces to visualize intelligent data from multiple angles to achieve decision goals. Therefore, the visualization process is divided into interface creation, unique image, and visual decision-making interface creation for the first time.

4 Analysis of Experimental Results

4.1 *Data Collection and Analysis*

In terms of data acquisition, the system provides connection interfaces for more commonly used databases, such as MySQL, ORACLE, and SQL Server. But with the rise of nonrelational databases, more and more NoSQL databases are used for data storage and business support. When transmitting video data, due to the complexity of the mobile network, there are often thunderstorms, rain, and lightning, resulting in inaccurate encoding and even loss of data packets when the data are transmitted. And it more seriously disrupts the normal operation of urban informatization management information, which can ensure that there will be no packet loss problems during the transmission of video data. Macroblock interpolation technology can reduce accidental errors during data and video transmission and avoid encryption errors caused by external video data interference during transmission. Error code recovery technology can analyze data and use iterative techniques to correct errors that occur. For example, by combining the corresponding spatial and temporal characteristics, synchronization code number, and other error control features of the video data frame sequence, the macroblock cannot be encoded, and the gray block can be directly modified by decoding, as shown in Table 4.

Table 4 Forecast comparison table (partial).

Serial number	Actual value	RBF predicted value	BP predicted value
1	6812	6585	7023
2	6758	6598	6895
3	6730	3256	7156
4	6657	6489	6898
5	6639	6578	7112
6	6347	6325	6759

Note: The square error of the RBF neural network is 3.21% and the maximum error is 4.58%; the square error of the BP neural network is 6.35% and the maximum error is 9.97%.

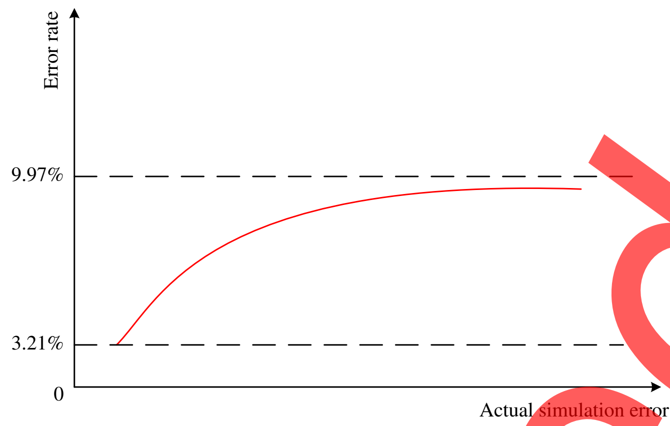

Fig. 8 Performance error curve.

The process of uploading new data set information is as follows. The data set uploader enters the link address, data table name, database user name and access password of the external data set into the system, clicks the link button to try to connect to the database, and clicks the metadata generation button to generate the metadata information of the external data set in the system. Click the snapshot button to view the information of the data set, and click the map button to map the metadata of the data set with the ontology model. In the video data transmission process, the fault-tolerant encryption protection macroblock input encryption technology, multiframe reference encryption technology, etc. are used to improve the performance of the video fault-tolerant video during the transmission process. The performance error is shown in Fig. 8.

Error-free coding technology uses synchronization position markers during video stream transmission, and useful codeword sequences can be found at the end of video data retrieval. But a bad sync position mark means there is a coding error. You can use position data and synchronization marks, synchronization data, video, audio, and video signals to improve the integrity of video data to a certain extent.

4.2 *Data Fitting Analysis*

Video-related data are more complete, and data analysis is faster and more accurate. The cloud video platform can store PB-level video data and collect all video data. And it can make more accurate decisions on the retrieval and analysis of video data. The cloud video platform has sufficient enterprise-level processing capabilities to accelerate the analysis of video and big data. Then use Table 1 to simulate the error line of the RBF neural network and the error curve of the BP neural network, as shown in Figs. 9 and 10.

Through the comparative analysis of the error curves of the RBF neural network and the BP neural network, the accuracy of the RBF neural network is higher, the relative error is smaller,

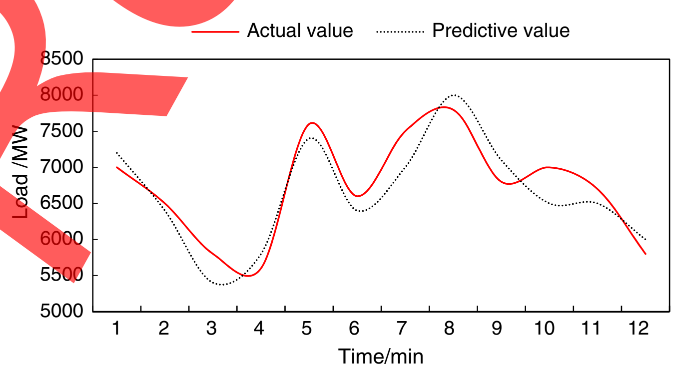

Fig. 9 RBF neural network error curve.

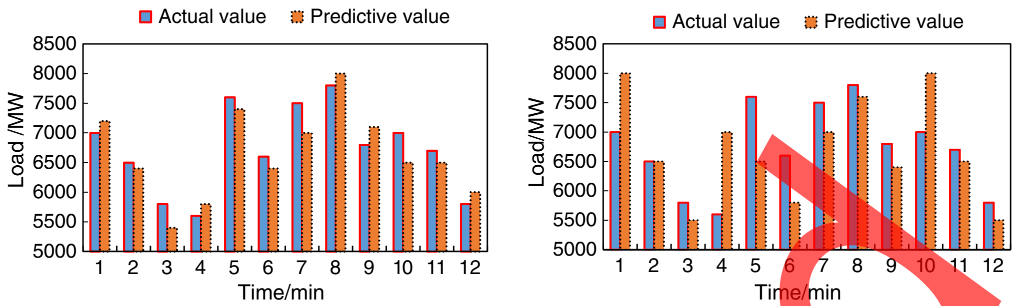

Fig. 10 BP neural network error curve.

and the average error of the prediction is basically controlled within 3%, which can meet the operation requirements of the power system and serve the society. Also, it can create higher benefits and have certain practical value. The domain ontology model is built on the basis of the eABC upper ontology. The model combines urban data, "land-event-object-behavior" network ideas and standard specifications, abstracts entity concepts in the smart city domain, and sorts out the relationship between entity concepts. First, the domain ontology model is described from the relationship between entity concepts in the domain and the upper ontology and the relationship between entity concepts in the domain.

The cloud video platform can store BP-level video data and collect all video data. It can also make more precise decisions to restore and analyze video image data. The cloud video platform has sufficient enterprise computing power to accelerate video analysis and big data and generate faster analysis results through cloud video, and by comparing RBF and BP to predict the data of the two, RBF obviously has stronger predictive video perception. Experimental data show that the error between video perception and actual data is within 3%. It can be seen that video sensors play a key role in the construction of smart cities. The response ability and information acquisition speed of smart cities' video perception systems will be greatly improved. This part of the knowledge module field will continue to develop in conjunction with the development of information and make great contributions to the image design of smart cities.

5 Conclusion

Economic development has accelerated the pace of urbanization, and more and more people have entered the city to live. At the same time, the area of the city is also expanding. Some advanced concepts such as information sharing and network information have been fully reflected in urban management activities. This article compares RBF and BP to predict the data of the two. RBF obviously has stronger predictive video perception. Experimental data show that the error between video perception and actual data is within 3%. It can be seen that video sensors play a key role in the construction of smart cities. It can better predict errors and has better video perception system performance. Big data video technology will become more and more mature, its functions will become more and more perfect, and its application areas will become wider and wider. In the future, big data video technology will be in line with international interface standards to achieve joint penetration and branch expansion in multiple fields, better support the construction of smart cities and improve load forecasting, and create favorable conditions for real-time energy distribution and power system control. Encourage the reasonable determination of power planning and improve the economic and social benefits of the energy system. Smart cities represent the development of the times. The image of the city is the unique spiritual outlook of the city, the embodiment of the inner connotation of the ideal of urban development, and the embodiment of the realization of external technology. The city image design is based on the analysis and comprehensive planning of the soft power of urban development. With the understanding of the smart city, the city can be the environment that has been greatly improved, and it also helps the city's street management and design. Urban development shapes the new image of urban culture and finally realizes the improvement of urban areas, which not only provides people with a good living place but also provides people with spiritual enjoyment. However, due to limited time and energy, there is insufficient research on some specific issues of this subject, and there are still some detailed questions that need to be answered. The future is foreseeable in the creation, and the future technology development is becoming more and more rapid. Video perception has also become an indispensable part of life. In the construction of smart cities in the future, there will be aspects such as image design, video perception, and information processing speed, and it will have higher requirements and prospects.

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Biography of the author is not available.