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Research Article

Spatial Conflict Risk Measurement and Early Warning Based on Network Information Processing

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The contradiction of land use is becoming more and more fierce in China, which poses a serious threat to the structural integrity and quantity of ecological land, the uncontrolled expansion of urban construction land, the imbalance between the spatial structure of agricultural land and ecological land, and the unreasonable spatial structure of various types of land within the city. This study mainly discusses the risk measurement and early warning of spatial conflict based on network information processing. In this study, GIS technology is used to deal with the risk of spatial conflict. Spatial conflict, in essence, is an objective geographical phenomenon arising from the competition for spatial resources in the process of human-land relations and is the result of the interaction between natural geographical factors and human factors, and natural geographical processes and human processes, and is a key factor affecting the sustainable development of the region. The logical network attack path composed of IP sequence captured by the space conflict network early warning and emergency response system is transformed into the attack path composed of a corresponding physical address sequence, which is directly displayed on the electronic map. At the same time, the attributes related to the spatial conflict events in the research area are also displayed in the form of a list. When the macro network early warning and emergency response system detect the occurrence of space conflict events in the study area, its emergency response subsystem queries the strategy database and outputs the emergency strategy in real-time by inputting the warning information analyzed by the early warning information analysis subsystem. Finally, the system realizes the functions of network node information visualization processing, network early warning and emergency response information visualization processing, and electronic layer basic operation. It is found that the industrial added value of the study area of ABC urban agglomeration has reached 283.140 billion yuan in recent three years, accounting for 60.25% of the industrial added value of the three cities and 30.98% of the whole province. The results show that the improper spatial regional combination has an important impact on the spatial conflict, and the improper spatial regional combination will significantly improve the level of spatial conflict.

1. Introduction

It is precise because of the contradiction between the "finiteness" of space resources and the "infinity" of the needs of the stakeholders that catalyzes the emergence and development of space conflicts. Space conflict is the difference in the use of tourism space resources value among the stakeholders. In the process of regional spatial evolution and development, the needs and values of various stakeholders are divergent and antagonistic. As a kind of "interaction" behavior among the stakeholders, conflict is an inevitable and objective process in the process of regional development.

In one embodiment, the information processing apparatus may include a receiving unit configured to receive a request for information identifying at least one second communication device from the first communication device. In such an embodiment, the second communication device may be associated with the first communication device, and the first and second communication devices may share at least one connection authority. The information processing apparatus may also include a control unit configured to obtain information based on a received request and generate an instruction to send the information to the first communication. Information processing facilities include servers, network equipment, desktop workstations and printers, photocopiers, ancillary equipment, communication equipment, and other equipment.

An information processing system, an information processing device, and a method are used to send image data from a portable terminal device to different devices via a network. Masakuni Yamamoto believes that the camcorder image station has a folder for each user of the camcorder. The camcorder has an album list of 10 albums from album 1 to album 10 in advance, and an album of one of the names is selected from the list to specify the album to which image data should be uploaded. His research lacks practice [1]. Hasan SF proposed an energy harvesting and information processing network based on a two-way multiplication relay. In his proposed scheme, two nodes communicate with each other through a multiplicative relay node with limited energy. The relay node uses a relay protocol based on power allocation for EH and information processing. His research process lacks data [2]. Bogdan *M* believes that the minimization of energy flow and free energy is the basis of almost all aspects of the natural physical mechanism. He hypothesized that the synapses in the network operating at these stable points can drive the network to a synchronously triggered internal state. There is no scientific basis for his research [3]. Schlegel A believes that the manipulation of mental representations in the human brain seems to be similar to the physical manipulation of objects in the real world. He used multivariate methods and functional magnetic resonance imaging (fMRI) to study the mental rotation of 3D objects in 24 participants or manually rotating their hands in one of four directions. His research sample is too small [4, 5]. Frolov N S believes that based on the correlation or synchronization inference of recorded neuronal activity signals, functional connections between brain regions can be realized. For each frequency band, he estimated the functional connectivity between different brain regions by comparing the Fourier spectrum of the EEG signal. His research is not practical [6, 7].

This research mainly uses GIS technology to process the information of spatial conflict risk. The system finally realized the visual processing of network node information, the visual processing of network early warning and emergency response information, and the basic operations of electronic layers. Convert the logical network attack path composed of IP sequence captured by the macro network early warning and emergency response system into the attack path composed of the corresponding physical address sequence, and display it directly on the electronic map. At the same time, the research area space conflict events related to the attributes are also displayed in a list [8, 9].

2. Spatial Conflict Risk Measurement

2.1. Space Conflict. The term "conflict" comes from sociology and is mainly used in sociology and management in the context of "cultural conflict," "organizational conflict," and "conflict of interest," where two or more social units are mutually exclusive in their goals, resulting in psychological or behavioral conflicts.

The spatial conflict can be divided into the following two points:

(1) The internal cause of the subject mainly refers to the driving force of the space capacity resources on the interest subject [10]. People's demand for space is limited in capacity. If the space capacity is too small, people's minimum resource requirements cannot be met, which leads to space competition [11]. This is the contradiction between the finiteness of space resources and the infiniteness of space requirements [12, 13].

(2) External incentives include two parts: lack of system and social environment induction [14]. One is the lack of responsibilities and institutional norms of government departments [15, 16]. The inaction of management agencies and the incomplete laws and regulations make the contradictions of different subjects at the spatial level accumulate and become more complicated, which eventually evolved into spatial conflicts [17, 18]. The second is the induction of the social environment. For example, the "enclosure movement" of capital to space continues to increase the degree of commercialization of space [19, 20]. External incentives continue to intensify the accumulation of the subject's internal causes, thereby accelerating the formation of spatial conflicts. The influencing factors of space conflict are shown in Figure 1.

Internal A represents the lack of responsibility and institutional regulation by government departments, and Internal B represents the inducement of the social environment.

2.2. Network Information Processing. An information processing system (IPS) is an information system that uses modern information processing technology to process business transactions and basic information in order to improve the efficiency and automation of business processing. An information processing system includes one or more information processing devices [21]. The system receives mail data through the network, including output data or output target data [22, 23]. There are different ways of classifying information processing systems. They can be distinguished by the application area of the information processing system, such as management information systems, airline reservation systems, and hospital information systems. They can also be distinguished by the structure and processing mode of the system, such as batch processing systems, random processing systems, interactive processing systems, and real-time processing systems. Based on the user information stored using the address information of the sender of the mail data or the address information in the destination of the mail data, he determines which output data are associated with the received output data or the output data generated based on the received output target data [24, 25]. When the user identification information is not determined based on the address information of the sender, but based on the address information of the sending destination, the system associates the data identification

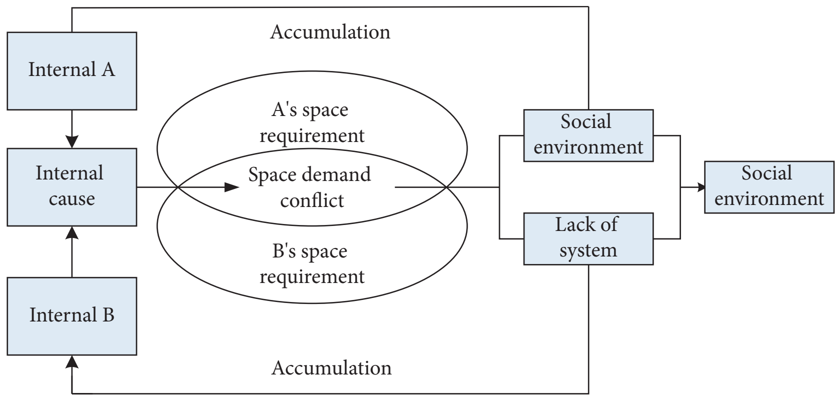

Figure 1: Influencing factors of spatial conflict.

information with the output data and stores it [19, 26]. Notify data identification information through the network [27, 28]. And transmit the output data associated with the user identification information or the data identification information received through the network [29, 30]. The characteristics of an information processing system are as follows: (1) the object of processing is the business and basic information in the organization; (2) processing efficiency and automation are sought; (3) simple methods; and (4) it is the foundation of information systems.

2.3. Spatial Conflict Measurement. Based on the perspective of geography, three types of spatial conflict measurement indexes are constructed from the three aspects of geographic spatial structure ratio, spatial combination, and transformation process to characterize and measure spatial conflict.

The development intensity index is as follows:

$$DI = \frac{S_C/S}{I}, \tag{1}$$

where S_C is the area of construction vacant land.

The agricultural retention index is as follows:

$$AR = \frac{S_a/S}{G} * 100\%, \tag{2}$$

where S_a is the space area. The fragmentation index is as follows:

$$PD = \frac{\sum N_i}{\sum A_i}, \tag{3}$$

where A_i is the number of functional patches in the space.

The spatial pattern conflict index is as follows:

$$AC = \frac{L_{rm1} * \alpha + L_{rm2} * \beta}{L_r + L_m} + \frac{L_{am1} * \alpha + L_{am2} * \beta}{L_a + L_m}, \tag{4}$$

where L_{rm1} is the adjacent side length between the residential space and the first-class industrial space.

The space occupation index is as follows:

$$EO = \frac{S_{ce}}{S_e} * 100\%, \tag{5}$$

where S_e is the initial ecological space area in a certain period of time in the space unit.

2.4. Early Warning of Spatial Conflict Based on GIS Technology. The external pressure index is as follows:

$$\text{AWMPFD} = \sum_{i=1}^{m}\sum_{j=1}^{n}\left[\frac{2\ \ln\left(0.25P_{ij}\right)}{\ln\left(a_{ij}\right)}\left(\frac{a_{ij}}{A}\right)\right], \tag{6}$$

where A is the land area.

The land exposure index is as follows:

$$E_i = \sum F_i \times \frac{a_i}{A}, \tag{7}$$

where F_i is the ecological risk coefficient of each land use type. The stability index is as follows:

$$P\ D = \frac{N_i}{A}. \tag{8}$$

The spatial conflict model is as follows:

$$SC = P + E - S, \tag{9}$$

where P is the external pressure index.

Accumulated temperature distribution model is as follows:

$$T = 35.02 \times L_s - 1.44 \times L_E + 0.78 \times L_R + 2278, \tag{10}$$

where L_s is the slope of the point. Average rainfall in the study area is as follows:

$$R = 7.07 \times L_s - 0.34 \times L_E + 741, \tag{11}$$

where E is the residual.

Topographic position index captured by GIS is as follows:

$$T = \log\left[\left(E/\overline{E} + 1\right) \times \left(S/\overline{S} + 1\right)\right], \tag{12}$$

where T is the topographic position index of unit i.

Topographic distribution index is as follows:

$$P = \frac{\left(S_{ie}/S_i\right)}{\left(S_e/S\right)}, \tag{13}$$

where S_i is the total area of land use type i in the entire study area. Land development resistance model is as follows:

$$Y_i = 1 - \frac{1}{\left[1 + 2.6 \times 10^{-5} \times (y_i - 3400)^2\right]}, \quad W_i = X_i \times Y_i \times (C_i + T_i), \tag{14}$$

where Y_i is the accumulated temperature resistance value of the i-th unit, and W_i is the development resistance value of the research area of the i unit [25].

3. Space Conflict Risk Measurement and Early Warning Experiment

3.1. Network Information Processing Data Integration Scheme

3.1.1. Spatial Data and Attribute Data Integration Scheme. Spatial data, also known as geometric data, are used to represent information on various aspects of the location, form, and size distribution of objects, and are a quantitative description of things and phenomena that exist in the present world with locational significance. The method of unified management of spatial database is adopted, and the spatial database of the macro network information processing subsystem is established with Oracle's Oracle Spatial to realize the storage and management of spatial data and attribute data.

3.1.2. The Realization of Spatial Data and Attribute Data Binding. The system mainly uses point reference binding and normal binding to realize the binding of spatial data and attribute data, and realizes it through the data sets. Add method of Map *X*.

3.1.3. Multisource Spatial Database Integration Scheme. Data access mode. This system adopts the direct data access mode as the main and the data format conversion mode as the auxiliary mode to realize the integration of multisource databases. To this end, this system uses the Active *X* component Map *X* developed by Map Info Company and uses Visual Basic to design and develop two modules: direct data access module and data format conversion module. Through these two modules, the integration of the system's multisource database is realized.

Direct data access of multisource spatial database

(i) The scope of application of direct data access mode

The direct data access mode is the main data integration method adopted by the information processing subsystem. When the system performs daily operation functions, this mode is often used to achieve access to multisource databases, thereby realizing the integration of multisource databases. This method is especially suitable for situations where the original data format needs to be retained. Direct data access enables clear application code, decouples application code from the data model, and organizes related data access code into individual components.

(ii) Structure and realization of direct data access module

According to the ways of accessing multiple data sources provided by MapX, the structure of the direct access data module is shown in Figure 2.

3.2. Database System Design

3.2. Database System Design. Using Oracle Spatial of the Oracle database, spatial data and attribute data can be closely linked to provide the necessary guarantee for the use of MapX components to read the data in the spatial database to complete the GIS functions. Attribute data, or nonspatial data, are geographical variables or geographical meanings associated with geographical entities. There are two types of attribute data: qualitative and quantitative. The former includes names, types, and characteristics, such as land use status, rock types, administrative divisions, and certain soil traits; the latter includes quantities and classes, such as area, length, and land class. In addition, the Oracle database itself is also a relational database. Of course, ordinary attribute information that does not contain spatial information but is closely related to spatial entity management can be stored in the Oracle database to provide a data foundation for completing the basic management functions of the system. Therefore, the design and establishment of the database system is a crucial link in the realization of the information visualization processing function of the macro network information processing subsystem. Relational databases fall into two categories: one is desktop data; the other is client/server databases. Generally speaking, desktop databases are used for small, stand-alone applications, which do not require a network or server and are relatively easy to implement, but they only provide access to data. Client/server databases are mainly suitable for large, multiuser database management systems.

3.2.1. Preparation and Management of Spatial Data. Create a database on the Oracle server-side and make the corresponding spatial data storage configuration. There are mainly the following two configurations:

(1) Create a tablespace for the spatial data to be stored. After the database is created on the Oracle server-side, there is at least one SYSTEM tablespace and USERS tablespace. It is best to create a new tablespace and configure the initial size and incremental size of the tablespace. In this system, we store the data in a tablespace named My GIS created by ourselves.

(2) Create a user who can access the data in the space to be stored. Create a new user in the database, and set the user's default tablespace to the tablespace created above, the user's appropriate role, system permissions, and object permissions. In this system, we create a user named My GIS, the default tablespace is My GIS, and the user roles are CONNECT and RESOURCE. In this way, the user has the right to access the space data to be stored.

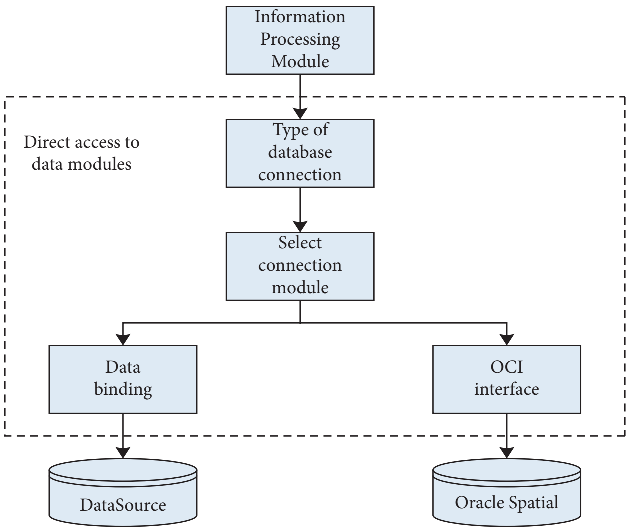

Figure 2: Structure of direct access data module.

3.2.2. Creation and Storage of Spatial Tables. The spatial table contains the information of each spatial column that can be displayed on the map in the database table to be accessed by Map *X*, such as the storage and index form of the map, the name of the map, the owner of the map, the name of the column storing the map spatial data, the coordinate system of the map, the boundary of the map, and the style information of the points, lines, and planes in the map.

3.2.3. Development platform and development tools. The system uses Map *X* component combined with Visual Basic language to carry out GIS secondary development to realize the visual processing of macro network information: Operating system: Windows 2000 Server; geographic information system platform: Map Info Professional 7.8; geographic information system development components: Map *X* 5.0; and database management system: Oracle 9.0.1.

3.3. Network Visualization Design

3.3.1. Realization of Registration. When performing registration, you first need to set the projection method, to avoid the deformation of the map and maintain the correct spatial relationship between the map entities. This system uses Gauss–Krüger projection. After selecting the projection method, the unit must be selected. The unit selected by this system is meter.

3.3.2. Map Vectorization. This system is a secondary development of GIS based on Map Info, so all the data formats of the system default to Map Info format, and MapInfo Professional 17.8 is used to complete the vectorization process when building digital maps.

3.4. Land Resource Service Model Design. The land resource service model is mainly realized by servicing the functions of the process acceptance module in the existing land resource management business application system. The service layer gathers various land resource services, including atomic services that can independently complete simple operations, and composite services that can use this layer and its underlying services to achieve more complex functions. The business process layer corresponds to the land resource process service in the classification system, mainly using the services in the service component layer to support the land resource management business process acceptance. In order to achieve flexible process customization functions, this layer also needs to use related network standards and implementation technologies such as service composition and service orchestration. The consumer layer corresponds to the category of land resource application services and provides a visual service interface for land resource management users. These five-level services realize mutual discovery through registration services located in the integration layer and then complete functional interaction. In addition, the five levels of service quality layer, information architecture layer, and governance layer can be added according to the situation and necessary services to provide value-added service characteristics such as service security, service monitoring, and service status.

3.5. Macro Network Information Processing System

3.5.1. Visual Query Module for Network Element Detection Information. The visual query module of network element detection information mainly realizes the intuitive query and display of the host and open port information collected in the macro network early warning and emergency response system on the electronic map, and conducts network security assessment for the early warning center. Information visualization is an interdisciplinary field that aims to study the visual presentation of large-scale, non-numerical information resources. It helps people to understand and analyze data by using techniques and methods in graphic imaging. And provide a basis for formulating response strategies. Network element detection information mainly includes active network element IP address, service and version, running time, and device type. The visual query of network element detection information mainly realizes the visual query and display of different attribute information of network elements through different operations on graphic elements.

3.5.2. Visualized Maintenance Module for Network Element IP Address. The query implemented in GIS is different from the query method of general information system that relies solely on text input. The related query function is mainly completed by operating the electronic map, which is convenient for users to operate and has intuitive characteristics. Of course, the system also provides a way to query by traditional text input query conditions.

The design of the macro network early warning and emergency response information processing subsystem is based on the premise that the network element has a static IP address, so the maintenance of the network element P address is a necessary function of the system. The "Network

Element IP Address Maintenance" module in the system is designed to meet this demand. When the system administrator selects the "IP address maintenance" menu item, the system enters the "IP address maintenance" interface and displays the IP addresses and network elements of all network elements of the type selected by the system administrator in a list in the List-View control: element name, network element type, and geographic location. When a certain network element is selected in the control and its IP address is modified and updated according to the actual changes, the system will automatically center the selected network element in the graphical interface, which is the realization of table search through the data binding process. The system administrator only needs to directly enter the new address in the control to complete the update of the network element IP address.

3.6. Network Warning and Emergency Response Information Processing Functions

3.6.1. Early Warning Information Classification Warning Module. The main function of the early warning information hierarchical warning in the system is to use the real-time data collected by the warning center database to perform statistical analysis on the number of network elements in each area under network attack, and use different color blocks in each area according to the different statistical results. Identification enables system users to have a quick and intuitive understanding of the severity of network attacks in real-time directly from the physical area. This function is realized by relying on Map *X* to create thematic maps.

3.6.2. Visual Display Module for Real-Time Early Warning and Emergency Response Information. The visual display of real-time early warning and emergency response information in the system is mainly achieved: the logical network attack path composed of IP sequences captured by the macro network early warning and emergency response system is converted into an attack path composed of corresponding physical address sequences. Directly, it is displayed on the electronic map, and the attributes related to the spatial conflict event in the study area are also displayed in a list. Since the macro network early warning and emergency response system detects a spatial conflict event in the study area, its emergency response subsystem queries the strategy database by inputting the early warning message analyzed by the previous subsystem (i.e., the early warning information analysis subsystem). Real-time output of emergency strategies, so for network attack events that have adopted emergency response strategies, the content of the strategies adopted will also be displayed in the network attack event attribute information list.

4. Spatial Conflict Risk Measurement and Early Warning Analysis

4.1. Study Area Based on GIS. The remote sensing image data based on GIS are shown in Table 1. The data of spatial conflict measurement mainly include remote sensing image data and planning data. This study selected three time points including Landsat-5 TM image, Landsat-7 ETM + image, and Landsat-8 ETM + image. Planning data include two parts: urban planning data and land use planning data. The urban planning data include the regional planning of ABC urban agglomeration, the overall planning of City A, the overall planning of City B, and the overall planning of City C; the land use planning data include the secondary adjustment data of ABC urban agglomeration and the survey data of land use change in relevant years. In the past five years, the urbanization rate of the ABC urban agglomeration has exceeded 30%, and the economy and society of the urban agglomeration have entered a period of rapid development; in the past four years, the development of the ABC urban agglomeration has improved resource conservation and environmental protection. The comparison of image data in the past 5 years and the past 3 years can reflect the state of the spatial conflict evolution of the ABC urban agglomeration after entering the rapid urbanization stage and before the approval of the "two-oriented society." The comparison can reflect the evolution of the spatial conflict of the ABC urban agglomeration after the approval of the "two-oriented society."

Table 1: GIS-based remote sensing image data.

Sensor	Type of data	Resolution (m)	Time
Landsat-5	TM	30	Nearly 5 years
Landsat-7	ETM+	30	Last 4 years
Landsat-8	ETM+	30	Nearly 3 years

Based on the preprocessing steps of image cropping and radiation enhancement of remote sensing images, a multistep and comprehensive classification method is adopted to interpret remote sensing images based on the resolution of remote sensing images. Remote sensing images are classified into land use types such as urban construction land, rural construction land, and transportation land. On this basis, the seven types of land use are classified into four spatial types: construction space, agricultural space, ecological space, and other spaces based on the characteristics of spatial functional differences. Using remote sensing image interpretation data and relevant data extracted from the overall urban planning, the spatial conflict measurement spatial units are divided into small squares of 1000 m × 1000 m, and the research area of the ABC urban agglomeration is divided into 9133 spatial conflict evaluation units, with the help of Arc. The GIS landscape analysis module analyzes and obtains basic data of the type of patch area and perimeter required for the calculation of the spatial conflict index, and finally calculates the spatial conflict index value of each region according to various index calculation formulas. The spatial classification situation is shown in Table 2. Figure 3 shows the spatial distribution of the study area in the past 3 years, 4 years, and 5 years.

The development intensity evolution of the research area is shown in Figure 4. From the perspective of the development intensity index, the development intensity of the research area is still in a controllable stage, but the growth rate is too fast, and it tends to get out of control. As the core area for the development of the ABC urban agglomeration, the study area has relatively high development intensity. In

Table 2: Spatial classification.

Spatial classification	Corresponding to remote sensing interpretation of land use types
Construction space	Urban construction land and rural construction land
Agricultural space	Arable land
Ecological space	Woodland and water
Other space	Unused land

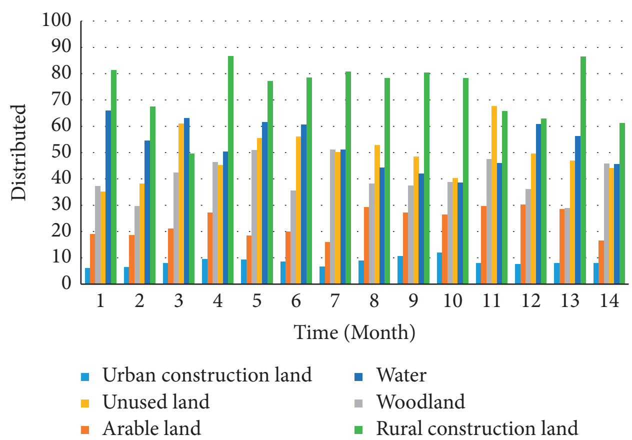

Figure 3: Distribution of spatial types in the study area in the past 3 years, 4 years, and 5 years.

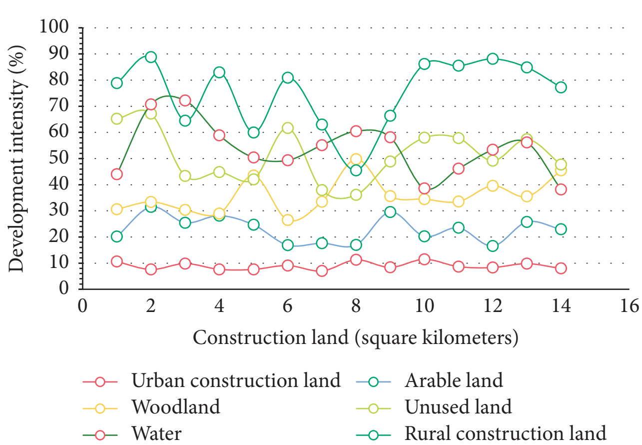

Figure 4: Development intensity evolution of the study area.

the past five years, the construction land area of the study area has reached 22.11%, and the development intensity index is 73.72%. The construction space has not exceeded the regional land space development intensity. The limit value is 30%, but the development intensity index has approached the safety alert value. The overall development intensity growth rate of the research area is gradually accelerating. The development intensity index in the past five years, the past four years, and the past three years is 40.02%, 48.26%, and 73.72%. The development intensity growth rate in the past three years has reached 25.46%, with an average annual growth rate. It reached 4.24%, which greatly exceeded the growth rate of development intensity in the past five years, and the development intensity of the research area tended to get out of control.

The change of the agricultural index in the study area is shown in Figure 5. The research area is a rapidly urbanized area, and the urban function is its dominant function. Agricultural functions, especially food issues, can be properly balanced through regional balance. A certain agricultural space plays an important role in maintaining regional functions and safety. In the past five years, the area of agricultural space in the study area has been declining, from 275.18 square kilometers in the past five years to 251.09 square kilometers in the past two years. The minimum agricultural control standard value is calculated based on the per capita arable land warning line of 0.8 acres and the basic farmland retention determined by the current planning of the study area, and the agricultural space retention index of the study area in the past 5 years, 4 years, and 3 years is calculated, and the research is found. The area's own capacity of agricultural space is limited, and it has become a trend of continuous shrinking, and the speed of shrinking and changing is gradually accelerating. Calculating the agricultural retention index based on the control standard calculated from the per capita arable land warning line, the results show that the agricultural spatial self-sufficiency of the study area has declined rapidly, from 78.39% in the past 5 years to 55.08% in the past 2 years, which brings hidden dangers to regional security. If we do not have time to control and guide, the possibility of spatial structure conflicts in a certain period of time in the future is greater.

4.2. Local Regional Conflicts. The changes in the development intensity of the study area are shown in Table 3. In the past three years, the proportion of construction land for space units in the study area has reached the upper limit of 90%; that is, the number of space units with the development intensity index $DI \geq 1$ is 297. These areas have high spatial structure conflicts and high conflict risks. They are mainly distributed in A, B, and C central urban areas: economic development areas, counties, and their surrounding areas; the proportion of construction land for spatial units in the study area reaches 60%, that is, 471 spatial units with a development intensity index between 0.67 and 1. Basically reasonable, the spatial conflict is relatively small but also has a certain risk; the proportion of the construction land of the space unit in the study area is less than 30%; that is, the space unit with a development intensity index of less than 0.33 is 7,366. These areas have a high degree of ecologicalization and conflict in spatial structure. Basically, it does not exist. From a local scale, the spatial structure conflicts faced by the central city and county are relatively large.

The development intensity change of the research area is shown in Figure 6. The development intensity of space units

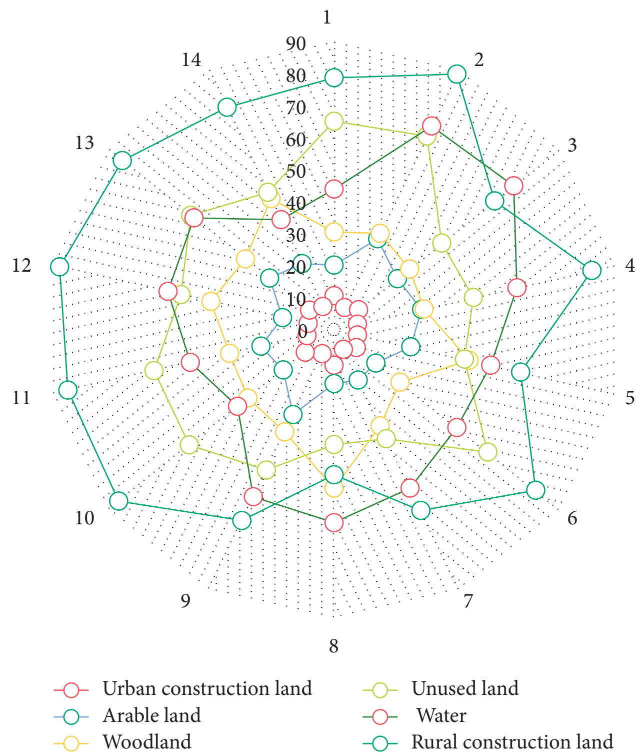

FIGURE 5: Changes in the agricultural index in the study area.

TABLE 3: Changes in development intensity of the study area.

Development intensity index	Nearly 5 years		Nearly 4 years		Nearly 3 years	
Level	Space units	Proportion	Space units	Proportion	Space units	Proportion
DI ≥ 1	80	0.88%	193	2.11%	297	3.25%
0.66 ≤ DI < 1	190	2.08%	289	3.16%	471	5.16%
0.33 ≤ DI < 0.67	483	5.29%	544	5.96%	999	10.94%
0.11 ≤ DI < 0.33	2387	26.14%	2490	27.26%	3944	43.18%
DI < 0.117	5993	65.62%	5617	61.50%	3422	37.47%

in the study area has generally increased. The number of space units with DI ≥ 1 has increased from 80 in the past 5 years to 297 in the past 3 years, and the number of space units with a DI < 0.117 that is less than 10% of construction land has increased from nearly 5. The number of 5,617 in 2015 has dropped to 3,422 in the past three years. Development and construction are expanding rapidly from the urban center to the urban fringe and satellite towns. The development intensity of the city A is northwest and southeast, city B is southwest, city C is east and northwest, county A is the economic development zone, and the river area development intensity increase is particularly prominent.

The analysis result of the ecological fragmentation index is shown in Figure 7. The space fragmentation index reflects the degree of space segmentation. The higher the value, the greater the human interference to the space, and the more severe the space segmentation, the weaker the stability of the space. This paper selects three types of arable land, forest land, and water areas that have high ecological value and are easily disturbed by human activities to calculate the ecological fragmentation index in the past 5 years, 4 years, and

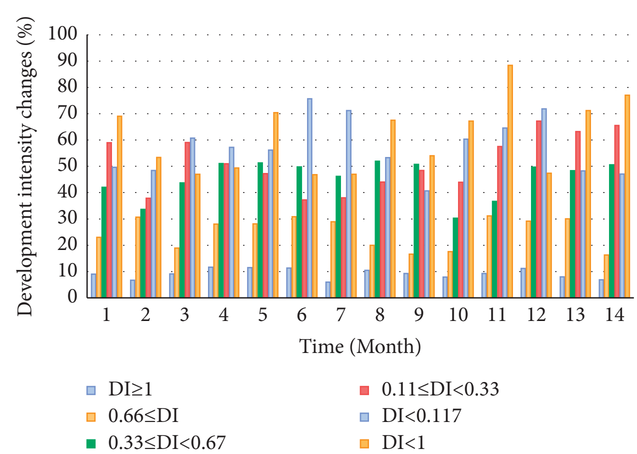

FIGURE 6: Development intensity changes in the study area.

3 years. The calculations found that the spatial ecological fragmentation of the study area is relatively high, and the space with ecological function value is gradually increased by human activities. The ecological fragmentation index of the study area is 0.409 in the past 5 years, 0.415 in the past

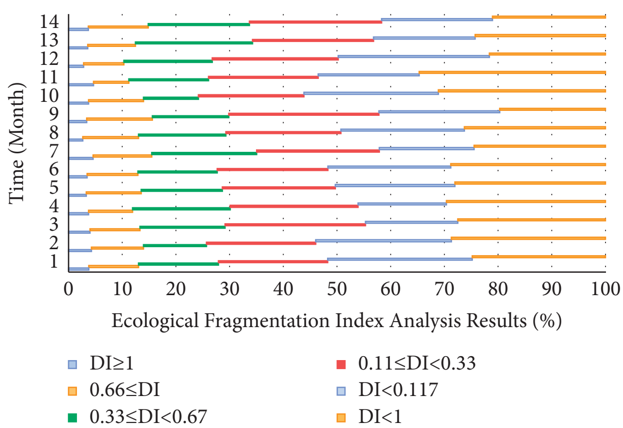

Figure 7: Analysis result of the ecological fragmentation index.

4 years, and 0.418 in the past 3 years. There is a slow upward trend; the area of ecologically valuable space affected by the interference of human activities has gradually increased, and the space units with a fragmentation index of less than 0.5 have dropped from 7,361 in the past 5 years to 6,984 in the past 3 years; from the spatial distribution, it can be seen that the areas with higher fragmentation index are distributed in the urban fringe areas. As the city expands outward, it gradually expands outward, and the more disturbed areas also move outward.

The space occupied by ecological functions of the study area is shown in Table 4. In the process of rapid urbanization, urban construction land continues to occupy nonconstruction land, realizing the expansion of urban space. The ecological occupancy index is an index describing the size of ecological occupancy area. The larger the value, the greater the possibility of spatial conflict. Using remote sensing image interpretation data, the ecological occupancy index was calculated for the recent 5 years to 4 years and the last 4 years to 3 years. From a global perspective, the ecological occupancy index in the past 5 years to the past 4 years is 0.05, and the ecological occupancy index in the past 4 years to the past 3 years has reached 0.11. The rate at which construction space occupies space with ecological functions has increased rapidly, and ecological occupancy is out of control trend. Figure 8 shows the compatibility results of adjacent spaces in the past three years. Different spatial types and geographical combinations have different possibilities of conflict risk. Among the various spatial layouts of cities, the amount of interference between spaces due to neighboring spaces differs due to the difference in space utilization characteristics, and the greatest risk of conflict with adjacent spaces is industrial space. The adjacency compatibility index of 170 spatial units is between 0.25 and 0.5, and the spatial pattern conflict is relatively light. The adjacency compatibility index of 357 spatial units is lower than 0.25, and the degree of spatial pattern conflict is very light.

The occupancy rate of ecological space in the past 5 years to the past 3 years is shown in Figure 9. According to the calculation results of the ecological occupancy index of the space unit, it is found that the ecological occupancy index of the urban fringe area is significantly higher than that of other areas, and the ecological occupancy index of the space unit generally shows an upward trend. The ecological occupancy index is greater than 0.6, the construction space occupies a larger proportion of the space with ecological functions, and the space units with large spatial process conflicts have increased from 238 in the period of 5 years to 4 years to 328 in 4 years to 3 years. These spatial units are mainly concentrated in the urban fringe areas that are most affected by the rapid urbanization process; the ecological occupancy index is between 0.3 and 0.6, and the spatial units with certain spatial process conflicts have increased from 317 in the period of 5 years to 4 years. The ecological occupancy index is between 0.1 and 0.3, and the space units with less obvious spatial process conflicts have increased from 825 in the period of 5 years to 4 years to 2261 in 4 years to 3 years; the ecological occupancy index is less than 0.1. The spatial unit that does not exist in the spatial process conflict has dropped from 7,753 in the period of 5 years to 4 years to 5,924 in 4 years to 3 years.

4.3. Spatial Conflict Control in the Study Area. Figure 10 shows the analysis results of the spatial development of some development zones. The space development situation of the development zone is shown in Table 5. In the past three years, the industrial added value of the ABC urban agglomeration study area reached 283.140 billion yuan, accounting for 60.25% of the industrial added value of the three cities and 30.98% of the province. The rapid development of industry is in the study area, while the continuous growth of industrial space has also resulted in an increase in the degree of inappropriate regional layout of spatial types, and the negative spillover of spatial functions caused by increased spatial conflicts. According to the developed area and the number of industrial enterprises in the 14 development zones in the study area in the past 3 years, the average land area of industrial enterprises in each development zone is calculated to indicate the degree of dispersion of industrial space in the development zone. The larger the average land area, the more dispersed the industrial enterprises are. The more scattered the layout, the more inappropriate the combination of space and region. The calculation results of dispersion degree show that the industrial spatial dispersion degree of each economic development zone ranks in the top five, and the degree of inappropriate spatial and geographical combination is the highest. In the past three years, the measurement results of the adjacency compatibility index that characterizes the spatial conflicts within the urban planning areas of the ABC three central urban areas show that the spatial conflicts in various economic development zones and industrial zones are serious. According to the comparative analysis of the results of industrial spatial dispersion and spatial conflict, it is shown that improper spatial and geographic combination has an important impact on spatial conflict, and improper spatial and geographic combination will significantly increase the level of spatial conflict.

Table 4: Space occupied by ecological functions in the study area.

Years	Index				
	Take up agricultural space		Take up ecological space		Ecological occupation index
	Total	Average	Total	Average	
Nearly 5-4 years	19993.19	1999.32	13875.17	1387.52	0.0450
Nearly 2-3 years	40979.07	6829.84	36292.68	6048.78	0.1058

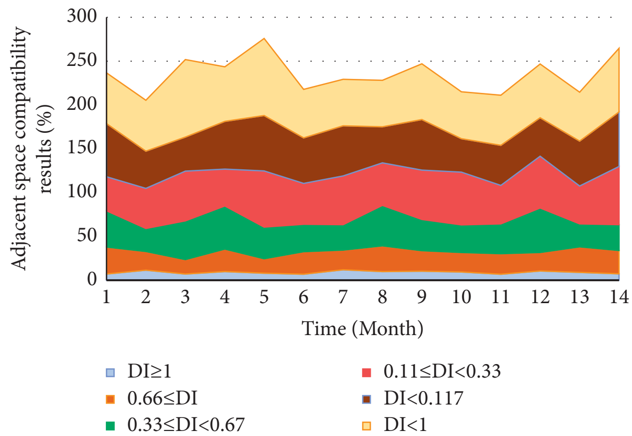

Figure 8: Compatibility results of adjacent spaces in the past 3 years.

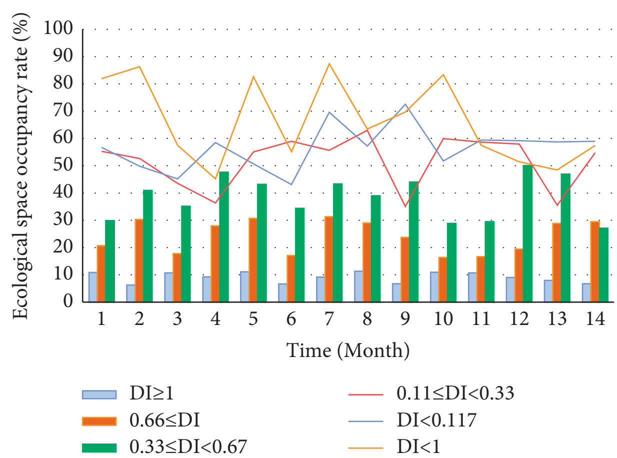

Figure 9: Ecological space occupancy rate in the past 5 years to 3 years.

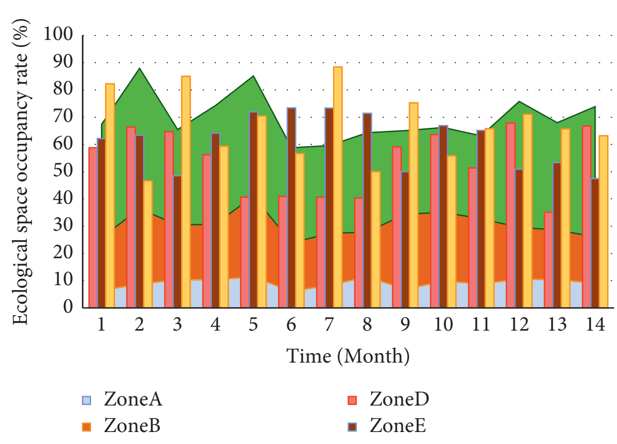

Figure 10: Analysis result of space development in some development zones.

Table 5: Space development in the development zone.

Development zone name	Level	Development area	Industrial land area	Number of industrial enterprises	Industrial space dispersion	Dispersion ranking
A	National	24.00	15.00	1075	0.0223	14
B	National	27.00	20.00	295	0.0915	7
C	Provincial	27.19	18.44	70	0.3884	1
D	Provincial	3.28	2.72	49	0.0669	8
E	Provincial	10.00	3.31	255	0.0392	13
F	Provincial	8.00	7.00	34	0.2353	3
G	Provincial	31.80	18.0	99	0.3356	5

5. Conclusion

Sorting out the different types of land resources will enable effective use of the various resources and prevent waste of space and disorderly management. The service layer gathers various land resource services, including atomic services that can independently complete simple operations, and composite services that can use this layer and its underlying services to achieve more complex functions. The business process layer corresponds to the land resource process service in the classification system, mainly using the services in the service component layer to support the land resource management business process acceptance. In order to achieve flexible process customization functions, this layer also needs to use related network standards and implementation technologies such as service composition and service orchestration.

The main function of the early warning information hierarchical warning in the system is to use the real-time data collected by the warning center database to perform statistical analysis on the number of network elements in each area under network attack, and use different color blocks in each area according to the different statistical results. The identification enables system users to have a quick and intuitive understanding of the severity of network attacks in real-time directly from the physical area. This function is realized by relying on Map X to create thematic maps.

The visual display of real-time early warning and emergency response information in the system is mainly achieved; the logical network attack path composed of IP sequences captured by the macro network early warning and emergency response system is converted into an attack path composed of corresponding physical address sequences. Directly, it is displayed on the electronic map, and the attributes related to the spatial conflict event in the study area are also displayed in a list. Since the macro network early warning and emergency response system detects a spatial conflict event in the study area, its emergency response subsystem queries the strategy database by inputting the early warning message analyzed by the previous subsystem (the early warning information analysis subsystem), real-time output of emergency strategies, so for network attack events that have adopted emergency response strategies, the content of the strategies adopted will also be displayed in the network attack event attribute information list.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The author(s) declare no potential conflicts of interest to the research, authorship, and/or publication of this article.

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