Research on the Construction of Urban and Rural Planning Land Classification System and Land Type Identification Based on Multi-Source Data of Internet of Things

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Abstract. At present, the classification system of urban and rural planning land still lacks the division of land functions, especially the in-depth study of land data conversion, which leads to the lack of effective use of land spatial classification data and the failure to establish effective classification system criteria. Based on this, this paper first analyses the construction of urban-rural planning land classification system and land type conversion convergence criteria, then studies the land type recognition based on multi-source data of IoT, and finally gives the optimization strategy of urban-rural planning land classification recognition based on multi-source data of IoT.

Keywords: Urban-rural, Land Classification, Multi-Source, IoT

1. Introduction

As an important guarantee and support resource for social and economic growth, land is not only a key component in the process of urban-rural planning, but also an important factor in the realization and growth of urban-rural spatial functions. Land type has an important impact on the balance between human, ecology and resources in social economy. In this context, to carry out urban-rural land use planning, it should to consider the relationship between land spatial growth pattern and ecological civilization construction systematically and comprehensively. As the basis of urban-rural planning land division system and land type identification, the scientific collection of land spatial data is particularly important [1]. On the other hand, in order to obtain scientific and objective land planning data, it is necessary to classify land under a unified standard. The classification and identification of land types are carried out according to the characteristics of land use. The current classification standards of urban-rural planning land are different, showing the typical characteristics of diversification.

At present, the classification system of urban-rural planning land still lacks the division of land functions, especially the in-depth study of land data conversion, which leads to the lack of effective use of land spatial classification data, the failure to establish an effective classification system criterion, and the strategy of multi-source data fusion. As an important resource with several attributes as shown in Figure 1 below, with the continuous amelioration of urbanization level, the demand for land in
various urban-rural planning is increasing. However, in the process of land spatial utilization and growth, the economic function of land is highly concerned, but its social and ecological functions have not attracted enough attention for a long time, which leads to the continuous erosion of the ecosystem function of urban-rural areas, resulting in a series of ecological crisis and problems.

In addition, under the background that the environment and ecology have gradually attracted the attention of the whole society, it is necessary to further carry out the connotation analysis of natural ecological space of land, especially the research on the classification system and identification method of urban-rural land, so as to build an organic connection between the classification system of urban-rural planning land and the classification system of natural ecological space of land. The scarcity of land resources makes the rational growth and utilization of land must be based on scientific data, so as to reasonably guide the planning, management and ecological protection of urban land use [2]. Based on all kinds of data, identifying urban-rural planning land, analyzing its spatial layout characteristics and establishing index evaluation system are helpful to establish a multi-source data support system.

In short, in the current environment of IoT, through the organic integration of the redundancy and cooperation of multi-source data of IoT, we can make full use of the advantages of multi-source data to extract the implied land spatial rules, summary relations or summary data features, so as to reveal the objective laws, internal relations and growth trends behind the urban-rural planning land data [3]. Draw support from multi-source data of IoT, it can ameliorate the technical decision-making and management decision-making support for urban-rural planning land, as well as the automatic classification and identification of land types, and accelerate the effective construction of urban-rural planning land classification system and land type identification system. Based on this, it has important practical value to study the construction of urban-rural planning land classification system and land type identification based on multi-source data of IoT.

![Figure 1. Typical attributes of land resources](image)

2. Construction of urban-rural planning land use classification system and criteria for land type conversion

2.1. Construction of urban-rural planning land classification system

The existing urban-rural planning land has different classification systems and classification standards, mainly based on the way of land use, characteristics and uses of land classification [4]. Urban-rural planning land classification is based on the existing basic geographic info classification system, with the analysis and application of geographical conditions as the demand basis, and carries out research on the socio-economic attributes of urban-rural planning land, so as to provide data support for the implementation of urban-rural growth. Secondly, the existing urban-rural land planning and spatial function division is difficult to effectively support the whole area coverage, the actual needs of urban-rural integration; do not use to build a cohesive urban-rural planning land classification system [5]. The urban-rural planning land classification system of multi system integration mainly includes several types as shown in Table 1 below.

| Primary classification | Secondary classification | Three level classification |
|------------------------|--------------------------|---------------------------|

Table 1. Classification system of land use for spatial planning
In addition, the urban-rural planning land classification system establishes an organic connection between the urban-rural planning land classification system and the land survey classification system based on the principles of land types as shown in Figure 2 below. The relationship between urban-rural planning land classification system and various land classification systems can be divided into many types, mainly including cultivated land, garden land, woodland, wetland, construction land, railway, highway land and infrastructure land in urban-rural planning land classification.

2.2. Connection between urban-rural planning land and current classification system
At present, the existing land classification system has been widely accelerated in land spatial management. The purpose of urban-rural planning land classification system is to investigate the urban-rural growth space, and accurately identify the urban-rural planning land space under multi-source data [6]. Therefore, it is very necessary to construct the organic connection between the urban-rural planning spatial classification system and other current land classification systems. The connection between urban-rural planning land classification system and other land classification systems is an important guarantee to realize the expansion and extension of land classification system. It not only effectively highlights the function and value of urban-rural planning land, but also makes the urban-rural planning land effectively connect with the actual land management, and thus effectively accelerate the practical application of urban-rural planning land use spatial classification system in urban-rural planning and construction.

3. Land type recognition based on multi source data of IoT
3.1. Land type identification method based on multi source data of IoT
At present, the mainstream methods of land type identification include quantitative calculation and merging classification. The former mainly uses the evaluation system of land spatial planning to meet the functions of urban-rural land, such as the effective quantitative identification of urban growth land, rural agricultural land and ecological land; the latter mainly uses the data of land use status to merge and classify, so as to realize the organic correlation between land use classification and urban land use classification [7]. The former method is not suitable for Multi-Agent and multi-scale spatial set of land effect expression, while the latter can effectively mobilize the function cognition of ecological land in the process of urban-rural planning. In addition, quantitative calculation is helpful to realize the quantitative identification of urban land use function, agricultural land use function and ecological land use function by using land spatial evaluation system.
In addition, by establishing the unified coordinate system and attribute structure of multi-source data, the urban-rural land type recognition model is constructed to effectively identify the land type space under multi-source data [8]. Through data overlay analysis, ameliorate the data attributes, so that each patch unit has multi-source data attribute structure. Through the construction of land class recognition criteria, the problem of land class conversion conflict of multi-source data is solved, and the remote sensing image data is used to modify the land class connection criteria recognition and combination recognition. The recognition process is shown in Figure 3 below.

![Figure 3. The process of land classification recognition](image)

3.2. Feature value selection of urban-rural planning land use function area identification
Firstly, at the level of recognition category ratio, the frequency density data is standardized, and the data is scaled to a small specific interval. Stratified random sampling method is used to collect training and validation samples directly from remote sensing images [9]. At the image data preprocessing level, the digital quantization value recorded by the sensor is converted into the relative value related to the surface physical quantity. In addition, at the level of image fusion, the low spatial hyperspectral data or multispectral image and high spatial resolution single band image are resampled to realize image data preprocessing, vector data processing and determine the best band combination of the data in the study area.

4. Optimization of urban-rural planning land classification based on multi-source data of IoT

4.1. Land identification analysis of urban-rural planning land based on multi source data
Based on the results of land type identification of urban-rural planning land, this paper analyzes the existing structure and difference characteristics of different functional elements of urban-rural land space from various perspectives, and formulates optimization strategies for land type identification of urban-rural planning land [10]. Different urban-rural spatial scales lead to different connotations and forms of urban-rural planning land use function. This paper deals with the analysis of land structure from the macro perspective of urban-rural areas. The different functions of urban-rural planning land are classified to complete the identification of different land types and the composite analysis of different scales.

4.2. Optimization of classification and identification of urban-rural planning land
Urban-rural spatial structure, as a combination of urban-rural areas, has an important value in achieving the coordinated growth of urban-rural areas and promoting the integration process of the combination area. The process of urban-rural integration of urban space and urban level is inseparable from efficient urban-rural planning integration. Optimize the characteristics of cities and towns,
ameliorate the division of labor and coordination, enhance the overall competitiveness of urban-rural areas, coordinate the construction of urban-rural integration, and accelerate regional coordination and sustainable growth. Taking into account the carrying capacity of resources and environment, rational allocation of land use structure, and accelerate the economical and intensive use of land and ameliorate the efficiency of comprehensive land use.

5. Conclusion
In summary, draw support from multi-source data of IoT, it can ameliorate the technical decision-making and management decision-making support for urban-rural planning land, as well as the automatic classification and identification of land types, and accelerate the effective construction of urban-rural planning land classification system and land type identification system. Based on the analysis of the construction of urban-rural planning land classification system and the convergence criteria of land type conversion, this paper studies the convergence of urban-rural planning land and the current classification system. Through the research of land type identification based on multi-source data of IoT, this paper analyzes the optimization of urban-rural planning land classification and identification based on multi-source data of IoT.

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