Research on Optimization Methods of Public Grassroots Governance Based on Big Data Analysis

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Abstract. With the continuous progress of the society and the continuous improvement of the people's level, the social mechanism is gradually sound, people also put forward higher requirements for public grass-roots governance. The development of science and technology, especially the emergence of artificial intelligence, provides convenient conditions for the expansion of the field of big data(BD), and BD analysis is gradually applied to various fields. At present, public grass-roots governance is faced with many difficulties due to its wide scope and complex content. Using BD for analysis provides more convenient conditions for promoting the optimization of public grass-roots governance methods. In recent years, the BD analysis and basic research deepening and expanding public governance scheme, we can conclude the traditional grassroots governance is to stay on the surface, there is no grass-roots level, the optimization study is based on analysis of large data base, only combined with digital information, through data analysis to improve work efficiency and better achieve better control effect. By studying the public grassroots governance based on BD analysis, this paper analyzes the existing problems of public grassroots governance under the background of BD, proposes solutions according to the existing problems, and continuously realizes the optimization of public grassroots governance methods.

Keywords: BD, Public Grass-roots Governance, Method Optimization, Collaborative Filtering Recommendation Algorithm

1. Introduction
At present, China is in a critical period and a crucial period to realize the qualitative change of development and set out to build a great modern socialist country to enter a well-off society under the guidance of the "four comprehensives", the core of which is "comprehensiveness", which is also the requirement of the socialist country, everyone's free and comprehensive development [1]. Grassroots governance occupies an important position in China's economic, political and cultural development. The quality of public grassroots governance and development is directly related to China's modernization and overall economic development. Therefore, it is urgent and of great significance to strengthen public grass-roots governance and optimize public grass-roots governance programs [2-3]. Therefore we must to do some in-depth study of the current public management at the grass-roots level, on the basis of the analysis of a large number of present situation of governance, to find out some
important problems existing in the current public management at the grass-roots level, and the use of BD technology to in-depth analysis of these problems, to get reliable data support, find scheme optimization of public governance at the grass-roots level, is especially important, this to our country grass-roots development and social sustainable development has important significance [4].

Scholars at home and abroad study of grassroots governance, policy, service at the grass-roots level, the various aspects of grassroots culture, also puts forward the relevant grassroots governance solution, such as seeking public space to promote grassroots governance, promote grass-roots soft governance and so on, these to promote grass-roots efficient management has great significance [5-6]. However, we must be aware of the complexity and diversity of the current public grass-roots governance work. Due to the limitation of data processing, it is impossible to conduct a comprehensive study on public grassroots governance, so the applicability of the research results is relatively narrow, and due to the difficulty in data analysis, there is no data support, and the accuracy of some research courses needs to be verified [7-8]. In general, there are relatively few studies on public grassroots governance under BD, and there are some research gaps.

In order to make up for this research gap, this article on the basis of large data analysis, use of collaborative filtering recommendation algorithm, analyses the background of BD problems of public governance at the grass-roots level, mainly includes the collection of grassroots governance division of labor, implementation, and public opinion, and puts forward countermeasures, according to the problems existing in the continuously achieve the optimization of the public governance at the grass-roots level and the [9]. Based on the analysis of BD, the study on grassroots governance tends to be in-depth and the conclusion is more reliable, which provides an optimization scheme for China's public grassroots governance and plays a huge role in promoting the efficiency of public grassroots governance. It also lays a foundation for future related research to a certain extent [10].

2. Method

2.1 Collaborative Filtering Recommendation Algorithm

In this paper, a model based collaborative filtering algorithm is improved, in which trust information is fused and graph clustering is used. In this paper, through the governance body/governance project data set to build the graph, in the process of the construction of the graphics, you first need to will be used in clustering dataset is mapped to a graph \( G = (V, E, W) \), \( V \) to clustering of grassroots governance body/grassroots governance project collection, \( E \) said grassroots governance body/grassroots governance project for the edge between the collections, each pair of grassroots governance body/W said the similarity between the grassroots governance project value. Secondly, in the graph clustering method based on grassroots governance subjects, the combination of trust information and Pearson correlation coefficient (PCC) similarity measure is used to calculate the final similarity value between each pair of governance subjects. The formula is as follows:

\[
W = \frac{2(sim(u, v)(trust(u, v)))}{sim(u, v) + trust(u, v)}
\]

(1)

Where, \( trust(u, v) \) is the trust value between the governing body \( u \) and \( v \). These trust values are divided into explicit or implicit values that need to be obtained from the trust matrix or calculated using implicit information. \( Sim(u, v) \) is the PCC similarity value between the primary governance subject \( u \) and \( v \), and its formula is as follows:

\[
sim(u, v) = \frac{\sum_{i \in Au, v}(r(u) - \bar{r}(u))(r(v) - \bar{r}(v))}{\sqrt{\sum_{i \in Au, v}(r(u) - \bar{r}(u))^2 \cdot \sum_{i \in Au, v}(r(v) - \bar{r}(v))^2}}
\]

(2)

Among them, \( r(u) \) is the rating of grassroots governance project \( I \) by user \( u \), \( r(u) \) is the average rating given by governance subject \( u \), and \( Au \) and \( v \) are the project sets assessed by grassroots governance subject \( u \) and \( v \). In the graph clustering method based on governance items, since trust
information cannot be introduced between grassroots governance items, the similarity value between grassroots governance items $i$ and $j$ can only be calculated by using PCC similarity measure.

2.2 Exploration on Grassroots Governance
Through the above calculation and analysis, combined with the use of BD to analyze the current management situation, the current public governance in China mainly face the following problems: one is the division of labor is unreasonable, the superior departments to many concrete work streets, villages and towns, and finally implement these work is the community residents' committees and village committees, grass-roots staff pressure, burden is heavy, division of tilt too obvious; Second, the law enforcement actions involved in the implementation of work tasks at the grassroots level need to be further brought into the track of rule of law. Many tasks assigned by the superior units involve law enforcement power, which is exclusive to the superior units according to law. Jiezhen has no relevant law enforcement power, and the law enforcement behaviors of jiezhen, grassroots law enforcement personnel and auxiliary law enforcement personnel lack norms and supervision. Third, when collecting and solving reasonable demands reflected by the masses, due to the limited powers of streets, towns and even individual government departments, many people's livelihood problems cannot be solved in a timely manner, which leads to the difficulties in handling affairs of the masses. For example, in view of the difficulty in entering the kindergarten and entering the school, it is difficult to coordinate all aspects at the level of streets and towns to solve the problems of building and expanding kindergartens and schools locally. Therefore, it is necessary for district-level or even city-level departments to do a good job in approval.

3. Experiment
Step1: firstly, divide the public grassroots governance subjects/grassroots governance projects into several clusters by using the graph clustering method, and then recommend the grassroots governance projects they are most concerned about to the active grassroots governance subjects through the found clusters. In the first step, the approximately densest subgraph lookup algorithm is used on the graph to find the central node of each cluster, and the found node is used as the initial center of the graph clustering algorithm. On this basis, collect the governance contents that the masses are most concerned about.

Step2: substitute into the formula to screen the content scene of grassroots governance of mass relations. The initial central set is iterated to form a better central set. During the iteration, each unselected node in the graph is first assigned to the nearest cluster center, and then the sum of the similarity values between each node in the cluster and other members is calculated.

Step3: finally select the node with the maximum associated value as the new center of the cluster. The node represented by the maximum correlation value is the most obvious problem in the public grassroots governance, and it is also the problem that the masses are most concerned about. On this basis to find out the optimization of grassroots public governance.

4. Discuss
4.1 Analysis of Experimental Results
According to the relevant data obtained from the above calculation experiment, the specific data are shown in table 1. The data is the author's collation result. It can be seen that China's public grass-roots governance still faces many problems, which largely affect the effect of China's public grass-roots governance, and we must optimize the governance plan for these problems.
Table 1. Data Results of Coordinated Filtering Recommendation Algorithm

|     | MAE   | RMSE  | Precision | Sim(u,v) | Trust(u,v) |
|-----|-------|-------|-----------|----------|------------|
| U   | 0.852 | 1.106 | 0.865     | 96.23%   | 95.27%     |
| V   | 0.923 | 1.257 | 0.843     | 95.69%   | 94.36%     |
| I   | 0.786 | 1.086 | 0.871     | 93.87%   | 91.75%     |
| Ri(u)| 0.725 | 0.935 | 0.916     | 98.87%   | 91.28%     |

*Data came from sorting of algorithm results

4.2 Optimization of Public Grass-roots Governance Methods

1) Build a diversified main body system of grassroots governance

The government, enterprises, public institutions, non-profit organizations, citizens and other organizations together constitute a diverse body. Grassroots governance is at the bottom of social governance and often presents many problems and contradictions. To modernize grassroots governance, party organizations and the government need to actively guide and coordinate various other relations to provide innovative help and support for solving problems in grassroots governance. Every subject should make its own responsibilities clear, especially those of the grassroots government, and try to let all parties express their views on grassroots governance. After the development and growth of other social organizational ability and sense of responsibility, the local government should ask other governance bodies to solve public problems and promote the development of all parties, take into account the interests of the public, and strive to protect the rights of all parties. Agencies in the cooperation governance, grassroots regime can have power inside the country society structure, relationships, and norms, form of grassroots regime "embedded governance", by the ingenious use of local rural resources, gradually to the means of informal system into its formal resources, can effectively connect the relationship between state and farmers, improve the efficiency of grassroots governance. Figure 1 shows the proportion distribution of grassroots governance bodies in China at present. The data are obtained by the author after consulting materials.

![Figure 1. Distribution diagram of the proportion of grassroots governance subjects in China](image_url)

2) Innovate grassroots governance rules and tools

The rules and tools of public grass-roots governance are important factors that affect the effect of public grass-roots governance. In the current practice of grassroots governance in China, some new governance rules and tools have emerged in addition to the traditional governance rules and tools. Traditional regulation-oriented governance is mandatory and authoritative. Administrative orders, laws and regulations are mainly used as governance tools. This method has a strong sense of control and
insufficient awareness of service provision. At present, in the implementation of grassroots governance in China, market-oriented methods have emerged to use market mechanism to allocate resources and solve public problems, such as infrastructure construction at grassroots level and basic public services. In addition, there are also some traditional governance based on social ethics mechanism, such as the tools and methods to achieve basic governance at the rural grass-roots level by utilizing the endogenous power of traditional rural society and playing the role of family system, village rules and people's agreement and rural elites. All in all, these have diversified, personalized and differentiated public needs of grassroots people, and at the same time reduced the burden on grassroots government, making it spend more energy on "steering" rather than "rowing".

5. Conclusion
Public grass-roots governance is an important part of the country's development and is related to the vital interests of grassroots people. Therefore, it is necessary to recognize the deficiencies in the current public grassroots governance and constantly optimize the methods. First, we should change our thinking, change our logic, adjust the governance system and mechanism, and build a multi-subject system of grassroots governance. We should constantly innovate the rules and tools of grassroots governance, get rid of the traditional way of grassroots governance, and strive to make grassroots governance in line with the development of The Times. Only in this way can we maximize the efficiency of public grassroots governance and better promote the sustainable development of grassroots.

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