Intelligent Rural Planning Management Based on MATLAB Simulation

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Abstract. With the continuous and rapid development of the economy and society and the steady improvement of the living standards of the people, the intelligentization of rural management has become a new concept and new path to build a co-construction and shared governance pattern. Although the intelligentization of rural governance in China has been strengthened conceptually and achieved some results in practice, there are still many problems. The purpose of this paper is to study intelligent rural planning management based on MATLAB simulation. This paper briefly analyzes the practical significance of rural intelligent planning and management, and introduces the advantages of Matlab software. Then the steps of image preprocessing are described, including image filtering and denoising and image graying. Based on this, this paper designs a rural intelligent management system based on Matlab software, which integrates three major platforms of information application platform, information service platform and infrastructure platform, covering most of the requirements of rural management. It also puts forward suggestions to promote rural intelligent management. This article tests the function, performance, interface, data, and requirements of the system, and obtains that the number of required bugs accounts for 5% of the total number of bugs. The experimental results show that the system can meet daily needs.

Keywords: MATLAB Simulation, Intelligent Management, Rural Planning, Rural Revitalization, Image Reprocessing

1. Introduction

There are obvious differences between the basic attributes of rural and urban areas. Although the construction of smart beautiful countryside is to solve the problems of farmers' production and life and rural social management, its connotation still shows its own characteristics compared with smart cities, such as paying more attention to solving the three rural issues. At the same time, the economic development foundation of China's rural areas is relatively weak, so the construction of smart beautiful
rural areas cannot copy the experience of smart city construction. For example, intelligentization and refinement are important directions for the construction of smart cities, making “precision agriculture” in the construction of smart beautiful rural areas. The concept is also popular, but in the actual promotion process, it can be found that, except for a few rural areas suitable for high-end facility agriculture and group operations, most of the rural areas are not ideal because of the influence of land dispersion and other factors. The path of beautiful rural construction in most parts of China is basically the same. It lacks regional characteristics and has certain one-sidedness and limitations. It does not give full play to the synergy of beauty and wisdom. Theodore Schultz, winner of the Nobel Prize in Economics, believes that the basic feature of traditional agriculture is to achieve a balanced allocation of factors. Otherwise, it is basically not profitable to engage in agricultural production. Therefore, to transform the traditional and backward rural face, the key is to introduce new production factors to achieve a higher level of equilibrium, and to integrate the wisdom elements into the construction process of beautiful countryside, which will help improve agricultural production efficiency and farmers. Income level, solve the problem of homogenization in the construction of beautiful countryside, and then promote the intellectual upgrade of beautiful countryside.

The advent of the era of big data has provided new ideas and paths for implementing the rural revitalization strategy and strengthening rural governance [1-2]. Using big data to connect rural life and industry as a symbol of intelligent governance innovation, making intelligent rural governance an important choice for building a new pattern of co-construction and shared governance in rural areas [3-4]. The implementation process of intelligent rural governance should be from small pilots to innovative big data, from management to governance, from a single subject to multiple subjects, and finally to achieve full coverage of rural governance [5-6]. At the same time that cities are rapidly undergoing smart governance, smart rural governance also needs to be vigorously promoted to promote the innovation and development of governance in our country and to promote the implementation of rural revitalization strategies [7-8].

This paper is based on the practical significance of rural intelligent planning management, and uses the advantages of Matlab software, combined with image preprocessing algorithms. A rural intelligent management system based on Matlab software is designed. This system integrates three major platforms of information application platform, information service platform and infrastructure platform. Experimental results show that the system covers most of the requirements of rural management.

2. Method

2.1. Significance of intelligent rural management planning
The intelligentization of rural management is the comprehensive application of digital, network and information technology in rural governance to better realize the functions of rural governance and improve the level of rural governance [9-10]. The intelligentization of rural governance has universal practical significance, which is not only conducive to rural progress and development, but also can stimulate rural vitality.

(1) Intelligent rural management can improve the accuracy of rural governance
   Intelligent village management means that information on various livelihood issues such as rural
medical care, education, employment, social security, and transportation can be timely and accurately feedbacked, and the scarce public resources in the village are efficiently integrated, so that problems in governance can be achieved without wasting resources resolve in a timely manner.

(2) Intelligent village management can timely feedback villagers demands

The convenient network system changed the original situation of poor information interaction, allowing villagers reasonable demands to be quickly and accurately transmitted to government departments, helping villagers to respond to various problems encountered in production and life in a timely manner, and at the same time, villagers the feedback is more complete, which helps to further improve the policy and legal system, so that rural residents can have a stronger sense of security and belonging.

2.2. MATLAB

MATLAB is a mathematical software that is unique in the numerical calculation of mathematical science and technology applications. MATLAB can perform matrix operations, plot functions and data, implement algorithms, create user interfaces, and connect programs to other programming languages. It is mainly used in engineering calculation, control design, signal processing and communication, image processing, signal detection, financial modeling, and design analysis [11-12].

In the programming environment, MATLAB consists of a series of tools. Using these tools, users can easily use MATLAB functions and files, most of which use a graphical user interface. Includes MATLAB desktop and command window, history command window, editor and debugger, path search, user navigation help, workspace, file browser. The new version of MATLAB provides a complete online query and help system, which greatly promotes the use of users. The simple programming environment provides a relatively complete debugging system. The program can be executed without compiling, report errors, and analyze the causes of errors in a timely manner.

2.3. Image preprocessing

(1) Image filtering and denoising

1) Median filtering

Median filtering refers to moving along an image using a moving window. In moving, the median of all the pixel values of the window is used to replace the pixel value of the center point of the window, and the median of the moving window is used to replace the median of the window. In a two-dimensional space, the ordinary moving window of a digital image is $3 \times 3$, $5 \times 5$, and other areas (for example, circles, circles, squares, etc., areas of different shapes or sizes can be used according to different requirements). Among these, the central value of the window generally sorts all image pixel values or signal values in the window from large to small, and selects the central value as the central value of the window. The two-dimensional median filter output is

$$ f(x, y) = med\{g(x-k, y-l), k, l \in A\} $$

Among them, $g(x, y), f(x, y)$ is the original image and the processed image. A is a two-dimensional window template, usually a specific shape or area.

2) Mean filtering
Generally, the neighborhood selected is a $3 \times 3$ area, so the average value of 8 points in the center neighborhood of the target is used to replace the pixel value of the original target. Mean filtering is to replace the original image pixel value with the mean of the neighborhood. If the original image is $g(x, y)$, the setting after the average filtering process is $f(x, y)$, then

$$f(x, y) = \frac{1}{\sum g(x, y)}$$  \hspace{1cm} (2)

Among them, A is the value of the filtered neighborhood, and $x, y$ is the coordinate set of the neighborhood points of the $(x, y)$ target point.

(2) Grayscale color image

Color images are organically composed of red (R), green (G), and blue (B). Grayscale images do not occupy data. The storage space is only 1/3. A pixel with a large gray value is relatively bright, and when it reaches 255, it displays white. If the gray value is 0, it is displayed as black. There are three common ways of gray processing:

Average graying.

Maximum gray level.

Weighted gray, as shown in the specific formula (3).

$$Gray = \omega_B \ast R + \omega_G \ast G + \omega_B \ast B$$  \hspace{1cm} (3)

$\omega_B, \omega_G, \omega_B$, is the weighting coefficient corresponding to the three channels.

3. Experiment

3.1. System architecture

The smart rural management system designed in this paper includes three major platforms:

Information application platform. The platform is divided into two major sections, namely the public service section and the management section. The public service sector includes: pushing public service information such as weather, environment, health, scenic spots, tourist tips, encyclopedic knowledge; providing tourists and surrounding villagers with traffic guidance, living guides and other services. Management section: It includes facilities operation management system, energy consumption monitoring management system, integrated security management system, integrated traffic management system, office management system, financial management system.

Information service platform. Establish a service facility layer that provides voice, multimedia, data and other information to support the above information application functions, such as user telephone switching systems and cable television systems that provide voice and video services for residential, hotel, and hotel services; and public broadcasting systems, Information guidance and query release system; provide wireless intercom system, GPS positioning system, vehicle management and guidance system for rural management; computer network systems, basic database construction, etc. that provide services for information interaction between various sectors.

Infrastructure platform. Including information access system, wiring system, mobile
communication indoor signal coverage system, satellite communication system, building equipment monitoring system, building energy efficiency supervision system, environmental monitoring system, automatic fire alarm system, intrusion alarm system, video security monitoring system, access control systems, electronic inspection systems, alarm intercom systems, parking garage (field) management systems, emergency response systems, computer room environmental facilities and computer room management facilities, and supporting intelligent system computer room projects.

3.2. Experimental environment
The computer used for system verification is configured with Windows 10, 64-bit operating system, 8G running memory, and i5-6200U CPU. The Matlab version uses R2028b.

4. Discussion

4.1. Experimental results and analysis
As for the test and analysis results, this paper mainly focuses on the performance of image sharpness. For this reason, rigorous tests have been performed, and finally all tests meet the design expectations. This paper tests the system by testing methods such as black box testing and functional testing. This test is ideal. Some bugs were found and corresponding improvements were made. The results of the bug distribution are shown in Table 1 and Figure 1.

| Bug | Data | Performance | Features | Interface | Demand |
|-----|------|-------------|----------|-----------|--------|
| Quantity | 3    | 3           | 3        | 10        | 1      |

Figure 1. Bug distribution results

4.2. Suggestions for promoting intelligent village management

(1) The government should strengthen top-level design and increase investment

First of all, the government must continuously strengthen the concept of intelligent rural governance, break through the limits of thinking, fully realize that intelligentization is an inevitable
requirement and inevitable trend of historical development, and actively guide and strengthen the development of rural governance towards intelligent development. Secondly, the government must strengthen the top-level design of intelligent rural governance, establish development goals and development models in a timely manner, and must not deviate from reality, nor can it be too low without confidence, and must coordinate the differences caused by various reasons in various regions and rely on the government with the credibility and coercive power of the government, according to the needs of the general public, a complete intelligent target system for rural governance and construction ideas are established, so that all implementers can follow the rules and complete the intelligentization of rural governance. It is necessary to establish a multi-subject model including farmers and various social organizations at all levels to participate in rural governance in order to help realize the intelligentization of rural governance. In addition, we must increase investment in the intelligentization of rural governance. The intelligent construction and promotion of rural governance requires rural software and hardware facilities, and a large amount of funds and resources. It cannot be carried out solely by the village itself. Therefore, governments at all levels must increase investment and support for the intelligentization of rural governance. It also oversees the rational use of resources by the grass-roots governments and the villages; encourages all parties in the society to increase investment and support for the intelligentization of rural governance, and provides basic guarantees for the smooth advancement of intelligent rural governance.

(2) Villagers must have civic spirit and raise awareness of participation

Villagers are a key part of the intelligentization of rural governance, and they must actively participate in the construction of intelligent governance. First of all, the villagers must have a civic spirit and increase their awareness of participation. The intelligentization of rural governance requires the active participation of community residents, and the citizenship of rural residents is an important guarantee for the active participation of community residents. Secondly, villagers should improve their own quality and enhance their ability to participate. Villagers should continuously improve their cultural quality and political literacy through learning, master the technology of using the Internet to participate in rural governance, so that they have sufficient ability to participate in the major issues of rural governance, and safeguard the interests of the village and themselves. Promote rural harmony and development. Thirdly, the villagers should strengthen the network moral construction and regulate the network participation behavior. Villagers need to continuously improve their legal literacy, moral consciousness, and the concept of the rule of law, strictly embed their own network moral behavior into the rules of the legal system, work hard to regulate Internet speech and behavior, and prevent extreme behavior on the Internet platform.

(3) To further strengthen the construction of data platforms

In the era of big data, the updating speed of data platforms has never been faster, and it is a test of the platforms and controllers used in rural governance. After the operator builds a platform, whether it is using a social software platform such as WeChat or QQ, or using an information disclosure platform such as Weibo, or even a website or APP, the durability of its use is a big problem. After the initial freshness of the villagers and managers has passed, the operator needs to retain users from both parties in order to make the governance intelligent and to save the second phase of intelligent investment. Firstly, the users of both sides must rely on the intelligent results, and truly be intelligent and easy to
live and manage; secondly, the intelligent vested interests should be truly handed over to the villagers, so that the villagers enjoy the right to participate in governance and democracy. In the end, intelligent governance should not be left alone in government affairs, but should also be convenient for villagers and provide effective help for science and technology assistance, farmers' income increase, and rural economic prosperity.

5. Conclusion
Through the practical exploration of the intelligentization of rural governance in China, it provides a new perspective for the development of rural construction to a certain extent, accumulates rich practical experience, and contributes to the reform and innovation of China's grass-roots rural management system. But the process of change will not be smooth, and many problems and challenges will be faced. This requires the joint efforts of the various parties in governance, and the relevant scholars to give a lot of suggestions and make joint efforts to promote the intelligent process of governance in our country.

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