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# *Discussion on Related Key Technologies in Distributed Remote Sensing Image Processing*

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***Keywords:*** Distributed; remote sensing image processing; key technology

***Abstract:*** Due to the rapid development of science and technology, remote sensing identification means have been applied in all aspects, especially in the civil and military, and have become an important means to obtain important information. Remote sensing image processing (processing of remote sensing image data) is a series of operations, such as radiation correction and geometric correction, image finishing, projection transformation, inlay, feature extraction, classification and various thematic processing, in order to achieve the desired purpose. Remote sensing image processing can be divided into two categories: one is to use optical, photographic and electronics methods to process remote sensing simulation images (photo, film), referred to as optical processing; the other is to use computer for a series of operations to obtain certain expected results, called remote sensing digital image processing. This paper will focus on the distributed remote sensing image processing method, and further study the possible challenges and key technologies in the practical application, in order to provide theoretical help for the practical work of workers in the same industry.

## 1. Introduction

With the advent of the information age, a variety of complex application technologies have been widely used, among which the mass of data is particularly prominent. The application scope of these technologies covers many aspects such as earth science data analysis, among which the most commonly used is remote sensing detection of key natural disasters. Based on this, combined with the decision-making system, effective countermeasures are formulated, so as to effectively solve the problems. With the expansion of large-scale spatial database, the traditional single sequence information processing already cannot meet the needs of the current, so, in order to better support the remote sensing and geographic information system data, it is necessary to strengthen the study of data division in distributed parallel remote sensing image processing, in order to further improve the efficiency and accuracy of information processing. By improving the efficiency of the processing technology, while reducing the original costs, we can achieve greater benefits.

## 2. The specific content of the remote sensing image processing technology

Remote sensing image processing technology is a kind of technical processing method to edit and draw the remote sensing data by using the drawing tools of computer technology, which plays a very important role in the process of map drawing and geographical research. The use of remote sensing image processing technology requires a very high level of technology, which includes three important aspects: air definition and mapping ratio ruler, pop resolution and band, date and time definition. First, the air clarity and the mapping ratio ruler are the key factors. The spatial resolution and mapping scale characteristics vary, but they play an important role in affecting the quality and reliability of the map. The combination of spatial resolution and mapping scale can greatly improve the reliability and operability of maps, thus providing strong support for map revision and update. Second, the pop resolution. Pop definition is an important indicator, which reflects the characteristics of electromagnetic radiation. Its measurement range is limited by the band. The more the band, the higher the definition of bop, which makes the application of remote sensing technology more convenient and accurate. Third, the date and timing definition of remote sensing image processing technology are significantly different, which is because different remote sensing mapping methods will produce different, which affects the quality and clarity of the image. Remote sensing image processing technology records the actual situation of the ground at a certain time, but the geographical phenomenon is variable, so the multi-temporal remote sensing technology must have the best period in a time period, which is the period that can most reveal the nature of the geographical phenomenon.

## 3. Advantages and characteristics of distributed remote sensing image processing technology.

Distributed processing system is an integrated computer system used for completing multiple functions, which can coordinate through network technology and transmit data in real time, so as to complete the processing of remote sensing image. Its core structure includes distributed control, parallel processing and graphics and image processing.[1] The distributed image processing system adopts modular structure and organically combines multiple image processing components and complex resources, so as to achieve high efficiency, high reliability and high scalability of image processing.[2] The multiple processing components of the system can work together, and the complex resources can be distributed storage, so as to improve the efficiency and accuracy of image processing. Using WAN or LAN, remote sensing graphics processing system can complete multiple computer components between each other, each computer has an independent control system and display, and their resources can be shared with the user, [3] the global control of the whole system by a number of different controllers, their running status will be determined by them, and their cooperation between the process will maintain a high degree of consistency and coordination. By establishing agreements, we can ensure consistency among all parties; [5] multiple processing components can work remotely together through message transmission technology using bilateral agreements. When we consider distributed computation, we need a computational model that can support distributed processing. Now, the distributed application systems are changing from the traditional Data Flow model and the Client-Server-Broker model to the Master-Slave model. The biggest feature of Master-Slave model is its flexibility, which can not only achieve task level parallel processing, but also can achieve algorithm level parallel processing, and its structure is very stable, can easily achieve load balancing. The Master-Slave model has extremely strong processing power, which can effectively transform complex computing tasks into simple parallel tasks, thus saving a lot of time and resources. Moreover, it can effectively transform multiple serial algorithms into parallel tasks, thus improving computational efficiency and accuracy. Using the Master-Slave model, the Master process is responsible for completing Allocate and Record, while other subtasks

are transmitted by Slave, and the calculation results are fed back to the user in time.

## 4. The environment supported by a distributed image processing system

The design of a distributed image processing AP is more complex because it needs to take into account the potential hazards to the surrounding environment, including explaining various programs, assigning various tasks, and maintaining communication messages and sharing. To effectively meet the challenges in distributed design, we must first establish a good supporting environment to better realize distributed image processing.

### 4.1 Processor scheduling in the distributed processing system

By using distributed image processing, we can quickly and efficiently deploy a task to each computer environment. To this end, we need to adopt two basic process allocation modes: static simulation and dynamic simulation. To do this, we need to develop and maintain a valid list of processes that contains all the information related to the process, and is able to clearly define the name, address and other information of each process, so as to control the entire network more effectively. With the development of distributed processing technology, we are able to use the existing index tables to build a global and dynamic process state that can achieve fast and accurate transmission and monitoring.

### 4.2 To analyze the actual communication of the line and the domain to explore the influencing factors

To further improve the programming speed of application programmers, we propose a new method for remote data transmission through data pre-delivery technology in a distributed shared storage system, usually implemented in units of pages. This method can be implemented under a DSM system. In this case, the true traffic will far exceed the net traffic. For more convenient computation, we reduced P to the original pixel size with the remaining conditions unchanged. Next, we will study three different real traffic quantities: point processing, line processing and area processing.

### 4.3 In the distributed processing system, we can ensure security through error processing and process termination.

Due to the improper operation of other users, the operation of the distributed processing process network may be negatively affected, leading to the local failure of the computer network, thus hindering the operation of the network, or may endanger the operation of the whole network. In an effective response to this practical question, the distributed process network should adopt time management mechanisms to detect and correct erroneous processes in time. When the response is set, a process should be terminated immediately once a process error is found. If a process error is found, a preset step should be taken to resolve the problem.

## 5. In the distributed remote sensing image processing system, parallel processing technology is adopted to realize efficient data analysis and processing.

### 5.1 UAV aerial photography function

Through the application of UAV remote sensing technology, real-time monitoring of the ground environment can be realized, and the latest cameras, such as laser scanners, photoelectric

transmitters and high-resolution digital photos, can also be carried, thus greatly enhancing the detection accuracy of the terrain. By using UAV remote sensing technology, we not only have greater flexibility, but also can make multiple and repeated measurements, and can overcome obstacles, such as obstacles and clouds, greatly improving the accuracy and speed of measurement. With the development of science and technology, the aerial photography function of uav remote sensing technology is being more and more used in various fields, especially in the field of urban and rural construction, which can help us to obtain accurate and complete geographic information, so as to facilitate the scientific design and reliable implementation of our urban and rural development strategy[4].

### 5.2 Provide api programming interface to facilitate secondary development

Through the restful programming interface, developers can easily achieve comprehensive control of the distributed cloud storage system and achieve all its functions.

### 5.3 Three distributed remote sensing image processing technologies are adopted to realize load balancing and task allocation to improve efficiency and accuracy.

Load balancing means that when using multiple processors, they can feed resources equally to the same subset, enabling load balancing across processors, thus improving overall system performance. With the development of technology, the performance and load distribution of multiple processors have become more and more complex, resulting in the effect of parallel algorithms being affected. In order to effectively reduce the complexity of parallel algorithms, the scale of the subtasks should be reduced to a minimum, thus helping to improve the overall running speed of parallel algorithms. By using the total control program, each processor can independently perform its own sub-tasks, and can timely send the report to the total control program according to the actual situation, so as to achieve the optimal task arrangement. However, although this way can give full play to resources, it cannot grasp the details of each task well, thus increasing the cost of system operation[6].

### 5.4 Analyze the digital and graphical information

The tools used are computer technology. In the process of processing of digital information, need to code the complexity of data information, and then according to the way can identify the image accurate generation, in this process can not only ensure the integrity and accuracy of the data information, using the logic also has rationality, in order to ensure the authenticity and accuracy of the image. In the processing of graphical information, the complexity is high, which is easy to lead to the distortion of the data. Therefore, it is necessary to transform the two-dimensional and three-dimensional information into plane information in a more scientific and accurate way to ensure the authenticity of the information. With the continuous improvement of The Times and reading means, the transcoding and generation of data and graphics will be optimized to the greatest extent, and finally the reading of three-dimensional images will be realized, so as to ensure the distortion of images, which will also be the main development direction of remote sensing image processing technology.

### 5.5 The distributed remote sensing image processing system using the parallel processing strategy can realize the efficient data processing and analysis

By adopting distributed remote sensing image processing technology, parallel processing can be

effectively carried out effectively, that is, by orderly dividing images, they are divided into several independent parts, and each part can complete the corresponding tasks independently, so as to improve the overall efficiency and accuracy. Different technologies provide different ways to process images, one of which is to refine the original images and retype the details according to different processing requirements. Another technique is to refine the original image, and to retype the details according to the processing requirements, so that the load balance of the processor is fully played. Through careful observation and study of the environment, we can clearly understand the actual load situation at each site, resulting in a more accurate estimate of the total load at each site. After fine analysis and calculation, we can reorganize the existing image data according to the conclusion drawn, so as to achieve a more accurate spatial positioning. However, using this technology also has some defects, that is, it can greatly reduce the ability of the control processor to interpret images and the efficiency of the data transmission.

### 5.6 Load balancing and task assignment

Load balancing can help us perform parallel computing more efficiently, achieving a high degree of integration of complex tasks by loading all processors (or devices) in balance. This method can improve the performance of the system while also reducing the load of the system. Given the current environment conditions, the performance of each processor are different, and their load allocation also has certain deviation, therefore, when a machine is busy processing the image data in the subregion, the rest is forced to stop running, resulting in the whole parallel algorithm running speed is limited, so as to reduce the efficiency of its operation. Higher efficiency by reducing the load on each processor and making them more. Each processor will first get the corresponding load from the total control program, and then return the calculation results there, and finally can get more load, so as to achieve the final goal. If a processor has enough capacity, it will have more capacity to accomplish more complex tasks; instead, if a processor has excess capacity, it cannot perform more complex tasks. Through the effective use of the CPU, we can achieve a uniform distribution of the loads. While dynamic task scheduling helps to save resources, it costs more. When the particle size is fine, it can increase the stability of the load, but cause the higher energy consumption of communication and image data, and reduce the energy consumption of communication and image data. Therefore, how to respond to load changes in a multiprocessor system.

## 6. Conclusion

In a word, the progress of distributed remote sensing image processing technology has brought us more information resources, and can obtain more information at a lower cost, which greatly improves the service ability of remote sensing image and the efficiency of using shared resources. Through the distributed remote sensing image processing system, users can easily access more abundant information resources, so as to obtain better services at low cost, which can not only greatly improve the operation efficiency of the service, but also greatly improve the use experience of personal computers or personal workstations. With the progress of visualization technology, the integration of component technology and distributed processing technology will bring a significant change to the modern remote sensing technology. The emergence of distributed remote sensing image processing system not only provides a more convenient way for the collection, storage and transmission of information resources, but also greatly reduces the cost, greatly improves the service level of remote sensing images, and makes more effective use of shared resources.

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