

# Research on Design of Medical Image Quality Control System Based on Cloud Computing

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**Keywords:** Medical Imaging, Quality Control, Cloud Computing

**Abstract:** Medical Image is a Complex Image That Reflects the Biological Tissue of Human Body. the Image Has a Large Amount of Information and is Difficult to Process. Medical Image Quality Control is a Key Link in Medical Image Research and Has Great Practical Value for the Application and Development of Clinical Medicine. the Main Purpose of All Image Processing Technologies is to Improve the Visual Effect of the Original Image and Further Meet the Human Visual and Psychological Requirements. Medical Image Quality Control is an Essential Stage in Medical Image Processing Such as Object Extraction, Quantitative Analysis and Three-Dimensional Reconstruction. from the Specific Analysis of the Current Medical System, the Medical Imaging System Has Been Fully Applied in Medical Diagnosis and Treatment Practice. This Application Provides Convenience for Medical Diagnosis and Treatment and Saves Time and Money for Patients. in Contrast, the Research and Development of Medical Image Quality Control and Detection Equipment Are Relatively Insufficient. Based on Cloud Computing Method, This Paper Studies the Design of Medical Image Quality Control System.

## 1. Introduction

With the Rapid Development of Medical Science and Technology, Medical Imaging Equipment is Developing Rapidly in Technology, Quantity and Quality. Medical Image is a Complex Image Reflecting Human Biological Tissue, Which Has a Large Amount of Information and is Difficult to Process [1]. Medical Image Quality Control is a Key Link in Medical Image Research and Has Great Practical Value for the Application and Development of Clinical Medicine [2]. Due to the High Noise Contained in Medical Images, the Blurring of Boundaries between Various Tissues, the Uneven Gray Scale within the Tissues, and the Relatively Low Contrast, It is Difficult to Achieve the Desired Effect by Using Traditional Segmentation Techniques [3]. Medical Image Quality Control is an Essential Stage in Medical Image Processing Such as Object Extraction, Quantitative Analysis and Three-Dimensional Reconstruction. with the Increase of the Number of Equipment and the Continuous Enhancement of Its Functions, the Risks Existing in the Equipment Are Also Increasing Day by Day. the Main Purpose of All Image Processing Technologies is to Improve the Visual Effect of the Original Image and Further Meet the Human Visual and Psychological Requirements [4]. Image Analysis Refers to Extracting Useful Information of Interest in an Image, and Then Calculating and Measuring the Extracted Information [5]. Analyzing and Studying the Development of Telemedicine Influencing Consultation System Can Further Make a Clear Understanding of Its Utilization, and Discussing Its Quality Control Can Effectively Improve the Quality of Consultation, So the Research on Related Contents Has Significant Practical Significance.

The Accuracy and Reliability of Data Obtained by Medical Imaging Equipment in Diagnosis and Treatment Are the Basis and Foundation for Accurate Diagnosis and Symptomatic Treatment of Patients' Diseases. Image Processing and Image Analysis Are Closely Related, and There Are Some Intersections between Them, But There Are Also Some Differences [6]. Medical Images Obtained for Various Reasons Inevitably Have the Characteristics of Fuzziness, Nonuniformity and the Like, and the Results Segmented by Using the Traditional Image Quality Control Method Are Difficult to

Meet the Requirements [7]. from the Specific Analysis of the Current Medical System, the Medical Imaging System Has Been Fully Applied in Medical Diagnosis and Treatment Practice. This Application Provides Convenience for Medical Diagnosis and Treatment, and Saves Time and Money for Patients [8]. It is Particularly Important for Medical Image Processing, and Medical Image Quality Control Technology is One of the Most Important Technologies in Medical Image Processing [9]. Due to the Low Resolution and Contrast of Medical Images and the Influence of Inherent Noise, It is Difficult to Meet the Requirements If Traditional Image Quality Control Methods Are Used [10]. Radiology Experts and Scholars as Well as Radiographers and Physicists Pay More and More Attention to the Research on Medical Image Quality Control and Assurance. in Contrast, the Research and Development on Medical Image Quality Control and Assurance Testing Equipment Are Relatively Insufficient. Based on Cloud Computing Method, This Paper Studies the Design of Medical Image Quality Control System.

## **2. The Concept of Quality Control and Quality Management**

With the Deepening of Human Understanding of Diseases, the Diagnosis and Treatment of Diseases Has Also Risen from Early Empirical Medicine to a Combination of Empirical Judgment and Quantitative Analysis. Quality Control and Quality Management of Medical Imaging Equipment Refers to the Standardized Operation in Strict Accordance with the Requirements during the Whole Process of Equipment Purchase, Installation, Debugging and Operation. with the Development of Medical Imaging Equipment and Hospital Information Construction, the Dependence of Clinical Diagnosis and Treatment on Medical Imaging Data is Increasing. through Medical Measurement, It Can Ensure That the Inspection Result Data Obtained by Imaging Equipment Are Reliable and Accurate, Thus Providing Reliable Image Information and Improving the Correctness, Standardization and Legality of Diagnosis and Treatment. Quality Assurance Includes Management and Technology. Only by Combining the Two Can Good Service Be Provided. Quality Management Requires That Every Scheme in the Imaging Process is Reasonable, and the Image Can Meet the Quality Requirements and Reasonable Interpretation of the Image, Which Can Reduce the Risks and Inconveniences to Patients [11]. without Medical Measurement, It is Impossible to Ensure the Safe and Good Operation of the Equipment and the Reliability of Its Measurement Results. in the Process of the Development of Consultation System, the Level of Informatization and Intelligence Has Been Obviously Improved, and the Specific Utilization Effect Has Made Outstanding Progress. in Order to Control the Quality of Remote Medical Image Consultation System, It is Necessary to Check the Quality of Every Link of System Operation. in This Way, the Final Quality Control Effect Will Be More Prominent.

In Quality Control Technology, the Image Quality is Evaluated by Detecting the Feature Value of the Object Image and Its Allowable Deviation Range. Since Cloud Computing Method Was Introduced into the Field of Medical Image Quality Control, Great Progress Has Been Made in Medical Image Quality Control. At Present, Medical Image Quality Control Based on Cloud Computing is Mainly Divided into Two Categories of Medical Image Quality Control Based on Region Nomination and End-to-End. Quality Control Inspection Includes Acceptance Inspection, State Inspection and Stability Inspection. the Main Problems in Remote Sensing Image Target Detection Research Are That the Target Detection Has Strong Pertinence and Lacks General and Robust Target Detection Models and Algorithms. Acceptance Inspection is the Inspection Carried out after the Medical Imaging Equipment is Installed or after Major Maintenance in Order to Identify Whether the Performance Indexes Affecting the Image Quality Conform to the Agreed Values. through Periodic Measurement Tests, the State and Operation Data of the Imaging Equipment Can Be Obtained, and the Changes of the Equipment Performance Parameters and the Specific Use State Can Be Mastered, Thus Enabling the Equipment to Be in a Good Operation State. the Medical Image Presented in Front of Us is Not as Clear as People Expected. It Often Results in Blurred Outline and Complicated Shape and Structure of the Captured Image Due to the Influence of the External Shooting Environment of the Carrier in the System. If There is a Problem in Personnel Operation, the Data Transmission of the Whole System Will Be Affected, So the Specific

Operation of Personnel Needs to Be Analyzed and Strengthened.

### 3. Design of Medical Image Quality Control System

In the quality control of medical imaging diagnosis report, how to reasonably solve the problem of disease diagnosis and improve the overall work efficiency is the direction of exploration and research for medical imaging departments. Image quality control technology is one of the important topics and one of the difficulties in the field of medical image processing. It is of great significance for image understanding, image analysis, pattern recognition and computer vision. Due to the difference between the imaging principle of medical images and the characteristics of human tissues themselves, the formation process of images is susceptible to tissue movements such as offset field effect, noise and local body effect. Therefore, compared with ordinary images, medical image quality control inevitably has the characteristics of blur and nonuniformity [12]. Medical image quality control is the process of dividing all pixels in medical images into several categories with great differences. Each pixel must and can only belong to one category, while pixels belonging to the same category have certain similarity [13]. Due to the large amount of image data, in order to ensure the real-time performance of the image acquisition system and reduce the burden on the system, the system first compresses the collected image data and buffers the compressed image data. When the next image data frame arrives, the corresponding motion detection algorithm is used to judge whether there is abnormal condition in the image. If there is abnormal situation, the system starts the storage module to store the abnormal image data, otherwise it will not be stored directly. Figure 1 is an image path for motion detection judgment.

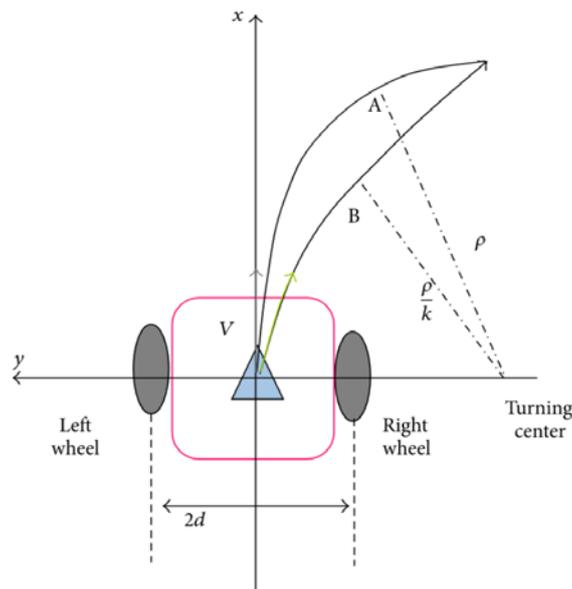


Fig.1 Image Path for Motion Detection

For some images, some parts of the target object exceed the boundaries of the image. No matter how the initial curve is placed, it cannot meet the requirements of surrounding the target object or being located inside or outside the target object. The performance parameters of image quality control before and after optimization are shown in Table 1. After wavelet transform and filtering optimization, the topology of image quality control is greatly optimized, with fewer nodes and better monitoring area. The simulation comparison of topology reliability optimization for image quality control is shown in Figure 2.

Table 1 Performance Parameters Of Image Structure Before and after Image Quality Control

	Before optimization	After optimization
The number of rows	121	154
Number of columns	63	89
Monitoring points	7623	13706

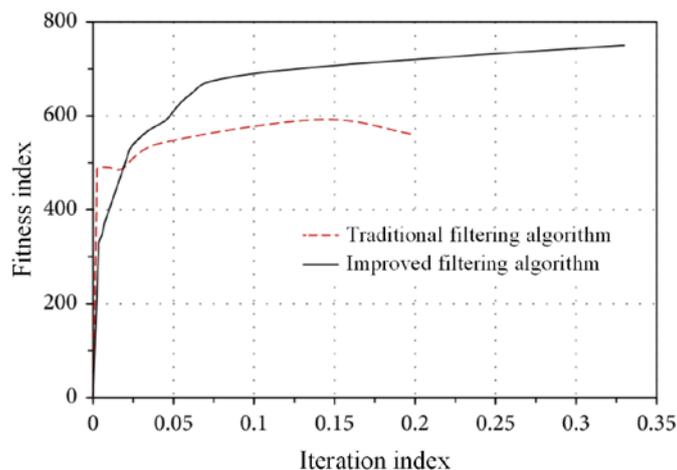


Fig.2 Simulation Comparison of Image Quality Control Filtering Optimization

The eigenvalues between adjacent pixels in the image are similar and they are likely to be divided into the same cluster. In addition to the effects of noise, field migration effects, and local body effects, the brain tissue images we actually obtain often show characteristics such as variability of tissue characteristics, blurry boundaries between different soft tissues, and the complex distribution of various tissue structures. . The gradient signal will not change through the median filter. This feature can be applied to image filtering, etc., because the data can be smoothed and the edges of the image can be well maintained. You can compare each frame and each frame of image and set different action points. Figure 3 shows the image cognitive structure system.

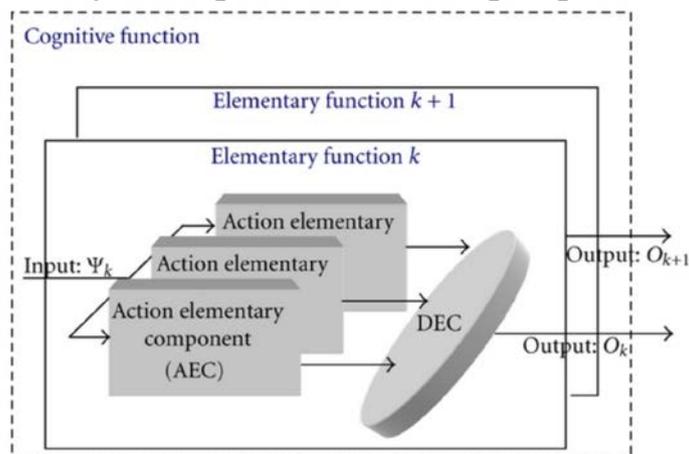


Fig.3 Image Cognitive Structure System

Quality control and management are indispensable to the safe and good standard operation of medical imaging equipment, and medical metrology is the technical means of quality control of imaging equipment. From the perspective of visual perception, image quality control seems to be a very easy problem to solve. In actual image processing, it is a very difficult task. The simplest and most common method to reduce the over-fitting of image data is to artificially enlarge the training data set by using the transformation method of preserving labels. At the noise, the edge stop function may reach a local minimum, making the model more sensitive to noise. The network is pre-trained without supervision, the weights are initialized with the pre-training results, and then the parameters are fine-tuned through the supervised training team network model. For image data, one way to expand the data set is to translate and flip the image horizontally without changing the image label. Distance preserving level set method lacks adaptability of direction and size. The weight coefficient not only determines the evolution direction of the zero level set, but also changes the amplitude of the stopping velocity function. For some non-edge parts due to uneven image gray scale will produce larger gradient values, the edge stop function will approach zero here, making the model inaccurate in controlling the quality of such images. The combination of measurement

techniques and equipment quality control can make the examination results reliable and lay a foundation for accurate diagnosis and treatment.

#### 4. Conclusion

Accurate and safe operation of medical imaging equipment parameters cannot be separated from standardized quality control and quality management. Carrying out quality control and quality management is of great significance for avoiding medical risks, ensuring medical safety and improving medical quality. Due to the low resolution and contrast of medical images and the influence of inherent noise, it is difficult to meet the requirements if traditional image quality control methods are used. Quality control and management are indispensable to the safe and good standard operation of medical imaging equipment, and medical metrology is the technical means of quality control of imaging equipment. Medical imaging equipment is the main component of hospital medical equipment. The qualification and quality of its parameters are related to the correct diagnosis and symptomatic treatment of patients' diseases, and to people's health and life safety. Through the research on the quality control of the image diagnosis report, we can standardize the imaging examination process and the selection criteria of diagnostic techniques, and gradually improve the diagnostic quality of the image report. To carry out the quality control of medical images can effectively prevent the occurrence of medical errors and disputes while improving their own medical level. To provide fast and reliable diagnostic basis for clinical diagnosis and treatment is of great significance for reducing medical risks and ensuring medical quality.

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