Research and Implementation of Robot Path Planning Based on Computer Image Recognition Technology

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Abstract. This paper focuses on the image processing and recognition module. The path planning module is only a simple algorithm research and implementation, the current system research needs to continue to improve, especially the path planning module. This paper studies the robot path planning based on image recognition, and on the robot contest platform to do simulation experiment, but in the actual application of robot environment is complicated, the robot camera collected images may be part contains several pieces of information, or part of the image and the other robot, the robot path planning of the how to do it. Moreover, the robot may be beyond our set range, and the dynamic path planning algorithm cannot guarantee the absolute acquisition of the optimal strategy. Therefore, how to improve the existing system, improve the accuracy of image recognition and improve the path planning algorithm is one of the important research work in the future.

Keywords: Robot, Path Planning, Image Recognition, MATLAB

1. Introduction
Intelligent robot is a global subject. In recent years become a hot research field in the process of development, the computer intelligent automation and artificial intelligence is intelligent robot path planning system robotikmu idea is an important part of the plan can be divided into environmental information identification, planning, and control the robot movement three ingredients, can be executed in parallel, it increases the system stability Shi xing robot, and route planning. From the point of view of environmental information and recognition function, robot maps need to be practical and accurate because robots adapt to the environment. Fast and accurate methods and plans for obtaining information provide optimization points for robot path planning algorithms[1].

The problem of robot path planning based on image recognition technology is studied. The robot collects environmental map information, sends it to the computer terminal for image processing and recognition analysis, and feeds the results back to the robot to send the robot task information. The robot moves forward based on the information it receives. The accuracy and real-time of image recognition determine the accuracy of path planning, so it is very important to enhance and de-noise
the image in the early stage of image processing. MATLAB toolbox is used for image enhancement and wavelet threshold denoising[2].

2. Basic principles and methods of image recognition

2.1. Concept of image recognition

Pattern recognition is to use computer to process and classify physical objects so that the recognition results conform to objective things as much as possible under the condition of minimum error probability. Pattern recognition is an application-based discipline. Its main purpose is to enable machines to automatically recognize objects and process information so as to complete tasks independently instead of people. Image recognition technology is the specific application of pattern recognition in the field of image. It is a computer image processing, analysis and classification to identify different patterns of the target and object technology. Image recognition is to classify and describe the observed objects or processes and make meaningful judgments. In a narrow sense, image is the pattern to be studied in image recognition, and image recognition is a subject of image recognition based on image processing technology[3].

Scientific research shows that images are the main way for people to get information from the outside world. These images are converted to digital images through discrete processing through image information (75%), computer image processing and actual image processing. Image processing is called digital image processing and recognition technology, which is called "image processing and recognition technology" in this paper[4].

Before image recognition and classification, image preprocessing should be carried out, including removing the noise in the image, improving the signal-to-noise ratio of the image, image enhancement and image segmentation and recognition are difficult, improving the image quality and image compression processing can realize rapid storage and propagation. Image recognition is a process of identifying and classifying images after a series of image preprocessing operations, and finally determining image classification[5].

2.2. Composition of the image recognition system

Image recognition system mainly consists of the following parts: image information acquisition, information processing and processing, feature extraction, recognition or classification, etc. Image information is mainly obtained through digital cameras, data collectors, etc., analog signals, optical signals and other information are collected through tools, and these information is converted into digital image information, and then the converted data information is displayed in a two-dimensional or three-dimensional way. A series of preprocessing is carried out on the collected images to extract the required feature information, analyze and describe the image structure, and finally output the structure and category of image information.
### Table 1. Strategy comparison table.

|                         | The relationship between subproblems       | the solution process                  |
|-------------------------|--------------------------------------------|---------------------------------------|
| Divide and conquer      | sub-problem independence                   | bottom-up                            |
| Greedy method           | current choice may depend on previous choice | from top to bottom                    |
| Dynamic programming     | subproblems can be independent             | save the solution site                |

**3. Specific work of project research: realization of image recognition system**

Based on the "Robot Challenge competition" for college students in Liaoning Province, this project takes the experimental intelligent robot independently developed by the research group as an example platform to complete the following work through learning and experimental research. First of all, environmental information collection and analysis, the collected images combined with MATLAB toolbox for image enhancement and gray processing, the wavelet threshold denoising, reoccupy canny edge detection algorithm, the final use of neighbor standard image recognition, improve the rules of the Euclidean distance algorithm based on class center minimum distance algorithm of MATLAB, the simulation results prove the effectiveness of the algorithm. Secondly, the dynamic path planning algorithm applied in the project is given, and the path planning of the robot is simulated by using the computer terminal MATLAB. Some images obtained in the experiment are given and analyzed. The existing problems and future research directions are pointed out.[6]

#### 3.1. Introduction to basic theory

MATLAB (Matrix Laboratory) is a commercial mathematical software developed by MathWorks, an American company, with powerful numerical calculation and visualization capabilities. It can be used for data processing and graphics display, which is convenient for developers to realize numerical calculation and graphics 0 during programming development. Is a set of scientific calculation, automatic control, signal processing, neural network, image processing and other processing functions in one, high programming efficiency tools. At the same time, MATLAB provides a powerful mathematical function library and a variety of powerful toolbox. This topic mainly USES the image processing toolbox and the wavelet toolbox to provide the function. Image toolbox is a graphic tool for image analysis, processing and algorithm development. It can support a variety of image types, including jpeg, PNG, HDF, MicrosoftExcel, ASCI and other formats. The algorithm provided by the toolbox can be used for image enhancement, image filtering, image segmentation, image transformation and other operations. The wavelet analysis toolbox is a visual wavelet analysis tool, which provides a good simulation and application platform for image processing. Late by MATLAB image processing and intelligent control, robot path planning can simplify the process of information processing, path planning algorithm for image recognition and implementation, through the collected data to identify the image block and other robots, robot and take appropriate action, for late mature MATLAB algorithm is applied to embedded terminal. The PC development tool of this topic is MATLAB 7.12.0(R2011a), and the operating system is Window7.

**4. Conclusion**

Intelligent robots are mainly concentrated in electronic, mechanical, computer, automatic control and the latest research achievements of many disciplines such as artificial intelligence, is a comprehensive discipline development in recent years, relative to the traditional industrial robots, robot autonomous perception, and independent decision-making, intelligent robot research has broad application prospects, based on the game of "robot" in liaoning province as a platform, for autonomous mobile robot as the research object, the image recognition technology is applied to path planning, this paper mainly in the late research results are as follows:

First of all, the combination of different types of sensor information, correct and effective to
identify objects, the theme of the ultrasonic sensor, camera, infrared rangefinder acquisition intelligent robot around information, information of the ultrasonic module, infrared distance information and image information fusion of image sensor, the effective implementation of the distance measurement, the precision of distance information, provide more detailed data for PC path planning.

Second, computer terminal image recognition system of the wavelet threshold denoising of image noise, the canny edge algorithm to extract edge feature information, and ultimately improve the Euclidean distance method based on class center, the minimum distance criterion algorithm, this algorithm does not need to obtain the samples library, by calculating the distance between two points directly find the minimum distance matrix and cluster into a point in the array, draw the clustering results of the image after three modules, specific algorithm by MATLAB programming, the algorithm is clear, simple operation, strong reliability, portability is strong, but there are also some disadvantages. For example, when analyzing a large amount of data, the clustering number needs to be modified to achieve the classification effect. At this time, the minimum distance criterion algorithm cannot be analyzed accurately and needs to be improved.

Third, path planning is a simple small program, in the process of research found that using dynamic programming strategy research more mature, the flowchart of algorithm implementation process, path planning, as well as the various modules need to do the task, through MATLAB simulation robot path planning, through the randomly generated five points, said another random motion of the robot is simulated by random function, and set the starting position of the robot, based on the simulation, dynamic path planning of the path and common path planning simulation process, according to the experiment and comparison, proved that the dynamic path planning can increase the winning probability.

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