Python-based Visual Recognition Classroom

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Abstract. This is a system based on Python technology to identify the seat. First,I use Python-programmed camera to capture multiple regions at the same time and preprocess the image, then transfer the data to the server through the transmission. Here we also use Python. The technology built a Django server, Django can provide independent web server caching, interface with Python unit testing tools, built-in applications. In this way, the server and the room seat information screen are connected with the server, which helps people to obtain the state information of the room seat remotely, and can use the web page to make an appointment in advance to solve the problem that people find a seat difficult and the seat resources are wasted.

Keywords: Regionalization; classroom; visualization.

1. Introduction

In today's colleges and universities, there are a lot of waste or shortage of seat resources. For some open libraries, conference rooms, stations and other places, there will be difficulties in seat preemption and management.

Many people cannot quickly and accurately understand the seating resources. The situation has led to a waste of time. Such as the school library and other places have a lot of seated behavior, resulting in the waste of resources and affect the progress of students. The existence of these phenomena not only reflects the problem of uncoordinated use of seat resources in many places, but also indirectly reflects the lack of attention to the use of resources in today's society.

2. Technology and Framework used in the Project

2.1 Visual Terminal

2.1.1 Visual Principle

Python programming camera: OpenMV is equipped with MicroPython interpreter, which allows us to program in Python using Python. With Python, we can use OpenMV-specific IDE, which has automatic prompts, code highlighting, and an image window. Directly see the image of the camera, there is a terminal to debug, and a histogram containing image information, more convenient and accurate collection of our image pigmentation points.

Open MV uses Python for secondary development without regard to memory application and release. We use Python programming to call the microPython library to capture the state of the target information more quickly.
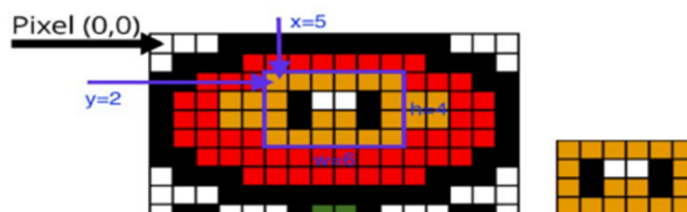

2.1.2 Vision and Master Connection.

The application of the Openmv camera to the project is mainly to achieve the purpose of gray value acquisition and data stream simplification. First, we first mark the area we need by using the box (or other means). After the mark is completed, we will mark this. The image is regionalized, and then we collect the gray value of the region through the function to obtain the gray value. After using

the function, we display the value in the terminal to facilitate the data test. When the test condition reaches the expected effect, we carry out the regional gray. Degree test and screening. For example, when someone has a gray value of 40 and no one is 5, we will perform a secondary screening of these gray values. By simple judgment statement, when the gray value of a certain area exceeds 40, it is set to 1, and when it is lower than 40, it is set to 1. In this way, we get a series of simple and easy-to-understand data streams. After getting the data stream, we can send the image to the MCU through the serial port on the camera (at the same frequency), and realize the regional recognition of the image and get the data we need flow.

2.2 Server Article

In the design of the selection system pair, the server is an indispensable part. Whether in the analysis of the web interface operation or the camera screen collection, the powerful server guarantee will make the user experience of the web application better, so the server is The design is very important. For the server performance, disaster recovery, security and other aspects, the structure of the server is shown below.
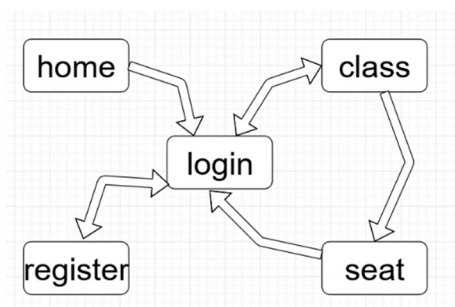
2.2.1 Server Technology

We use Alibaba Cloud's server, configure the Django environment in the server, accept the data sent back from the MCU through the database, and use the js script to control the color and the seat button on the server. Finally, the corresponding status is displayed on our webpage. When someone has made an appointment, the button is gray, someone has been seated in red, and no one is blue, and the visualization effect can be achieved to the user.

2.2.2 User Manual

User Manual First, the user logs in to our server by applying the account password, and enters the login page. We use the Django framework. The Django framework uses python programming to import the user-entered account password into the database and then automatically return to the home interface after registration. After entering your own account password, click on our data to automatically compare with the back-end database. After verifying the correct, enter the class interface (user selection interface). There are multiple floor selections under the class interface. Users only need to click the corresponding floor to enter the seat. Interface (seat interface), the interface will display all the seat information including sitting, not sitting, there will be a selection interface on the right. Users can choose the seat according to the prompt and their own needs to truly realize the classroom visualization effect.

2.3 System

2.3.1 System Framework

For data security and better performance, the overall structure is roughly divided into three parts. The server initiates a request to the server through the webpage, and then the server analyzes the information returned by the camera, and the server transmits the analyzed data to the database for comparison analysis, and then returns the comparison analysis result to the server to obtain the final result, and then passes the webpage. Return the result and get the data you want.

2.3.2 System Connection and Precautions

After the image analysis of the camera, use the serial port on Openmv to connect with the MCU. Connect TXD and RXD and set the baud rate to transmit data correctly. In order to communicate with the server after receiving the data, we use 4G module to write the server in the function. After the domain name and port number, the self-regulating power supply ensures stable transmission, because when the ordinary battery is used, the voltage will be reduced to less than 4G after the transmission, causing the transmission data to be wrong. When the transmission is successful to the server, write the script. Let the button of the webpage correspond to the data. After the whole project is successfully operated, the camera re-refreshed the image after 2 seconds to continuously transmit the image to ensure that there is no data missing and accumulation in the transmission. Write the correction program on the server and receive it again when the data is wrong. The camera serial port is resent.

2.3.3 System Versatility

My system can be applied not only to traditional classrooms, but also to some coffee shops or hot pot restaurants, etc. where there are more people and less seat resources. When these places are installed on our system, people can use the web page. Everyone is watching this area at any moment. The flow of people is too big to decide whether or not to go to eat. You can also make reservations for seats through this page. Sending reservation information to the merchant does not require some other software to make an appointment. It is very convenient to be able to implement these functions on one web page.

2.3.4 System Management Requirements

(1) Functional requirements: Users can browse the idle status of seat resources, reserve relevant resources according to individual needs; users view reservation records, modify or delete reservation requests; resource managers manage their respective resources according to assigned rights; review user's appointment application ; release system notifications; perform resource cycle usage statistics and analysis.

(2) User interface requirements: The operation interface is required to be able to handle various operations conveniently. For example, the input format of the question should be easy for the user to understand, the amount of additional information is small, and the operation is relatively simple. At the same time, you should be able to check for errors and provide clear, understandable error messages, including the location of the error, the cause of the error, tips or suggestions for modifying the error.

(3) Performance requirements: The system is required to be simple, convenient and fast, and the maintenance of the system can be completed efficiently with less manpower.

(4) Security requirements: The system is required to prohibit illegal access. On the one hand, foreign intruders cannot obtain any information inside the system. On the other hand, they must fully protect the user's personal information, that is, protect their registration information and reservation record information. A user cannot view the information of other users. In order to ensure the safe and reliable operation of the entire management information system, necessary security measures must be taken in terms of data backup, network security, data security, operating system and IIS settings.

2.3.5 Systematic Social Value

Today's social feasibility has a wide range of content, it needs to demonstrate the possibility and reality of information system development from social factors such as policy, law, ethics, system, management, and personnel. Social feasibility also needs to consider operational feasibility, and analysis of operational feasibility must be based on the actual operating and user environment in which the information system is used.

In today's classrooms and people with a lot of people, there is no online booking function. In many places, the seats cannot be used reasonably, which causes waste of resources. If our system is online, students or people who need convenience can make appointments and inquiries online. Reasonable use of seat resources, so our system reservation and inquiry function can solve this pain point well, and with the development of the times, classroom intelligence and maximization of seat utilization is the trend of the times, our system will Really benefit the society.

2.4 Project Market Demand Analysis

2.4.1 Market Application

Continuously research and develop software and hardware to form its own unique advantages. In the early stage, propaganda will be the focus of development, and various preferential activities will be carried out online to increase consumers' awareness and recognition of this website; increase the thrust of the offline and strive for more seating resources.

Actively cooperate with shopping malls, schools, railway stations, airports, and bus stations to forecast and evaluate policies in a timely manner. All regions attach great importance to the utilization of resources in public places. The reservation seat system needs to rely on active cooperation with relevant departments in various regions to facilitate rapid entry into the market and to avoid the risks brought about by policy adjustment.

2.4.2 Market Services

On the basis of optimizing the original service projects, we will open up more information on the seat visualization and booking services in libraries, schools, etc., to bring more convenience to customers.

After the customer has reserved the seat, the prompt "This seat has been reserved" is displayed through the LED display outside the venue. Real-time monitoring and management of seats is realized by cloud server and background management system.

2.4.3 Customers

In order to improve the utilization of seat resources and protect the interests of the partners, the platform will draw a corresponding proportion of the deposit before the customer makes an appointment. After the appointment is completed, the customer can choose to withdraw the deposit or choose to deposit the deposit on the payment platform for the next appointment, and finally establish the margin mechanism to ensure the security of the customer service.

Increase the utilization of seats by encouraging customers to arrive at the seat as soon as possible by arriving at the reserved seat within half an hour after the appointment.

2.4.4 Possible Internal Changes

Regularly check the operation of the monitoring equipment and update the hardware equipment according to the specific situation. In addition, the user is encouraged to repair the faulty seat in time by discounting the seat fee.

3. Conclusion

With the development of science and technology, the intelligence of choosing a seat is the trend of the times. The biggest difference between my system and the traditional movie theater is that my system can observe the state of a region from time to time, and it can bring people very much by comparing the change of pigment spots in one area. With a lot of convenience, as long as you don't leave home, you can see if someone has a seat in a classroom. On the other hand, it is not only convenient for people, but also saves more seat resources. The waste of seat resources is also Indirectly reflecting that some of the resources in society are not being wasted, I believe that the future application prospects of this project will be better and better.

References

[1]. Brian K. Jones: Python Cookbook (People Post Press, United States 2015).

[2]. Milan Sonka, Roger Boyle: Image Processing, Analysis, and Machine Vision (Second Edition) (Brooks/Cole Publishing, 1999).

[3]. Information on https://www.python.org/.

[4]. Information on https://openmv.io/.