QT display interface design of new retail system based on computer vision

Yali Wang *, Jinghao Ma, Xinke Zhang, Jun Jiang, Ming Shen
Zhonghuan Information College Tianjin University of Technology, Tianjin, China
Correspondence author email: tg778899@xzcstudio.com

Abstract. With the rapid development of science and technology, the application of computer vision is more and more widely, and there are great changes in all walks of life. New retail can rely on this advantage to improve the intelligent settlement of supermarket and reduce the workload of supermarket staff. In this paper, we use deep learning to train the goods that need to be settled, and identify the goods in the video during the settlement. At the settlement interface, Alipay two-dimensional code is generated to sweep the code for customers. QT is used to display the process of commodity identification and settlement.

1. Introduction
With the rapid development of science and technology, all walks of life also have great changes, most shopping malls and supermarkets use manual settlement or consumers through self-service scanning code settlement, which has the problem of slow settlement speed[1-4]. There are some new unmanned supermarkets using RFID technology[5], which will inevitably lead to the recovery of RFID chips and cost problems in large-scale application. This paper uses video analysis combined with deep learning to replace the traditional manual settlement and RFID chip identification settlement, which makes the settlement become efficient and fast, and gives customers a good shopping experience. The principle of the new retail system based on computer vision is to get pictures from the camera. After identifying the products, the corresponding information is sent to the database, and the bill is generated on the system interface. After clicking the confirmation order and the settlement, the corresponding Alipay generated payment two-dimensional code will appear, users can sweep through Alipay to achieve payment.

2. QT interface design
2.1. Opening and closing of the system
The system uses a button with a base class of QPushButton to control the system on. There is also a button with another base class of QPushButton to control the system off. When you click to open the system, all functions of the system will be opened. In order to prevent misoperation, when you click shut down system, the prompt box with qmessagebox as the base class will pop up to show whether to shut down the system.

Figure 1 shows the interface display when clicking the "open system" button.
2.2. Database information processing
After clicking the "open system" button, you will see the real-time image display and a proportion visualization of popular products at the bottom right. Here, Python's own Matplotlib library is used. In this step, when the system is opened, the MySQL database will be connected to obtain the sales volume of popular products, and the proportion chart will be drawn according to the sales volume, and the display will be saved. At the same time, the bill information and the account information in the database will be obtained. The identified product information is used to refresh the two qtablewidget controls. If the previous information has not been cleared, click the "refresh order" button to clear the previous information.

2.3. Video display
In this system, the camera is used to collect the image, and the image is drawn with a label control whose base class is qlabel, and then a base class is timer of qtimer_. The camera timer is used to control pixmap refresh on the label, and refresh once every 30 ms. The "product identification display window" on the top left will display the real-time picture captured by the camera.

2.4 Show identified items
After clicking the "click to identify products" button, the latest frame image captured by the camera at that time will be obtained. The collected images will be processed through the training model to obtain the recognition results. When the recognition is successful, the system will automatically upload the identified commodity information (including the number, name, price and number of commodities) to MySQL database to generate account information. The information identified and the current bill information will be displayed on the system interface in a timely manner. Click the "refresh identification" button to add goods, and the goods will be added after the previously added goods. When "click to identify commodity" (Taking Yunnan Baiyao toothpaste as an example), the interface displays the corresponding information. If you want to add a product, click the "refresh identification" button. At this time, the interface will enter the real-time display state of the video. Click the "click to identify product" button again to add the product. Figure 2 shows the interface display when the "click to identify products" button is pressed again (taking the green arrow for identifying commodities as an example).
2.5 Generation of Alipay two-dimensional code

After clicking the "confirm order" button, a thread will be opened (the thread's class inherits the base class qthread) to run pay.py (which is modified to sort out the connection database access information and Alipay payment two-dimensional code generated code), click the "settlement" button will show Alipay pay two-dimensional code, you can use Alipay sweep to pay (currently used is a branch). Pay treasure official sandbox), scan code payment after the two-dimensional code invalid, the next customer directly click to refresh the order. Figure 3 shows the interface of clicking "confirm order" and then "settlement". The QR code has been generated.

3. Conclusion

This paper introduces the identification and settlement of goods and sales data based on computer vision, and uses the knowledge of deep learning, OpenCV video processing and Alipay sandbox. It completes the main task of identifying goods and generating two-dimensional codes. Finally, it designs interface with QT, and it can visualize and collect video collection and commodity identification, sales data. Fubao QR code is displayed in the corresponding position of the interface, and the corresponding information is stored in the database.
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