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Design of AI online ecological picking system based on matlab visual recognition

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Abstract: *With the rapid development of social economy, people's living standards have been greatly improved, and the quality of life requirements have also undergone many changes. Green picking and ecological picking have become an important part of people's lives. Ecological gardens and picking gardens across the country have also developed rapidly, but the current picking is affected by the region. Northern users can use the online picking system to solve cross-regional picking and expand the picking market to meet users' online picking of original ecological fruits and vegetables in different regions.*

Keywords: *MATLAB; WEB development technology; database storage technology; AI recognition technology*

1. Introduction

With the progress of the times, science and technology are constantly developing, and intelligence is also constantly being improved. Intelligence has gradually replaced manual work. Green picking and ecological picking have become an important part of people's lives. Ecological gardens and picking gardens across the country have also developed rapidly, but the current picking is significantly affected by the region. How can users in the north realize the picking of high-quality, original ecological fruits and vegetables with regional characteristics in the south? This kind of problem needs to be solved. Through the online picking system, it can solve cross-regional picking, expand the picking market, and meet the needs of users for online picking of original ecological fruits and vegetables in different regions. This is the main feature and advantage of this system. We have designed an online picking system. This system uses intelligent images to recognize the maturity of fruits and vegetables. According to the maturity period of the fruits and vegetables, the recommended picking time and other functions allow users to query the time to pick fruits and vegetables in different regions online, realize remote picking and determine the delivery method waiting for operation, this is the characteristic and advantage of this system.

2. The main content of the project research

The project mainly collects existing data, uses matlab, AI recognition technology, WEB development technology, and database storage technology to develop the ecological picking identification system design. The main modules of the online ecological picking system:

2.1 User module design

2.1.1 Main page

You can inquire about event information, latest offers, online picking, online appointment, order query and other pages.

2.1.2 Online picking page

Online picking of the products that users choose to pick.

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2.1.3 Online appointment page

You can browse the fruits and vegetables on the page and make an online appointment for the fruits and vegetables you want to pick. Each page has its own information and functions. Users can understand the information in a timely manner.

2.2 Backstage management module design

Everyone needs an account to enter. The administrator can add and modify fruit information through the background, design new product pages and complete new functions, realize order query and order processing functions, and update product content in time , Can answer the questions raised by customers and provide consulting services, and provide customers with reference information

2.2.1 Design of picking management module

The template library is established through image acquisition, and the computer is used to analyze and understand the image. First, the AI-based smart sensor camera is used to collect images, image preprocessing is performed for problems such as noise, large light and dark gaps, and image enhancement processing is performed on the preprocessed image, and the image is segmented to extract important information. For the establishment of the template library and the preprocessing methods in the test images, image enhancement and Gaussian distribution denoising methods are used. Image segmentation uses semantic segmentation methods to group and segment the images according to the semantic meanings expressed in the images, and perform features according to the segmented images Extract, then classify, and if it matches the template, export the database corresponding to the template.

2.2.2 Design of remote management module

Users can remotely check the ripeness of fruits through the client, and query the conditions of fruits and vegetables in different regions, which can improve people's daily life, greatly improve the quality of fruits, and help fruit farmers' sales.

2.3 System hardware composition

This system uses a smart sensor camera, the product uses OpenMV4H7Cam smart camera as the main image acquisition device, processor ARM32-bit cortex-m7 CPU, RAM size 1MB, FLASH size 2MB, camera focal length 2.8mm, size 1/3, horizontal viewing angle 115 Degree, vertical viewing angle 90 degrees, infrared filter 650nm, image format jpeg, operating temperature -20 degrees to 70 degrees.

In this system, OpenMV4H7Cam mainly realizes the functions of infrared thermal imaging, color recognition, shape recognition, rectangle recognition, circle recognition, straight line recognition, face recognition, edge detection, connected domain detection, optical flow, template matching, feature point tracking, two-dimensional Code recognition, pupil detection, barcode recognition, rectangular code recognition, AprilTag target tracking, frame difference, video recording, wireless image transmission, etc.

The OpenMV4H7Cam smart camera can collect real-time data and photos of fruits and vegetables. The hardware device vision module has a micropython onboard parser, which can download python scripts to the module, the onboard compilation is based on the micropython machine vision algorithm, and the micropython processing script can be written using the vision module IDE with syntax highlighting.

2.4 System software composition

This system includes two major modules: back-end management module design and member picking management module design. The background management module can manage fruits and vegetables, manage user information, and manage orders. The member picking management module can realize user registration, user login, and online picking. This system can view the ripeness of fruits and vegetables in various places from time to time through the remote. Log in to the homepage of the website and member login to view the fruits and vegetables you want to see. The system will link the camera to view the fruits and vegetables according to your needs, and you can follow the system The recommended automatic ordering, remote picking and mailing provide convenience for people to buy

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fruits and vegetables from far away. The functional block diagram of the system is shown in Figure 1.

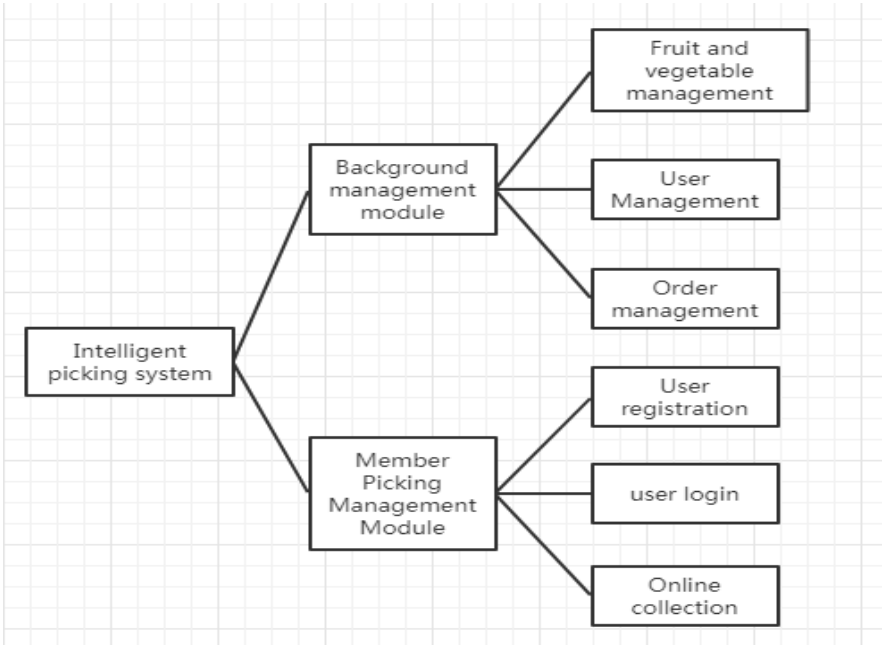

Figure 1.

The system software includes control programs, databases, hardware devices, etc. as the core components. This system solves the convenience in video image recognition. At present, based on AI visual recognition, it can quickly realize photographing and detection. The part of the code for realizing photographing and detection functions is as follows:

```
#camera function
Sensor.snapshot()
#Circle detection
Image.find_circles()
#Face feature detection
Image.find_faetures(face_cascade)
#Template matching simple photo program
import time, sensor, image
from image import SEARCH_EX, SEARCH_DS
sensor.reset() #Initialize the sensor (camera)
# Set up the sensor
sensor.set_contrast(1)
sensor.set_gainceiling(16)
```

sensor.set_framesize(sensor.LCD) #Resolution, if LCD screen is used, it needs to be LCD. It is the same as the template matching program.

```
sensor.set_pixformat(sensor.GRAYSCALE) #Photo mode, grayscale image mode
```

sensor.skip_frames(time = 200) # Delay to skip some frames and wait for the photosensitive element to become stable.

```
sensor.set_auto_gain(False) # Color tracking must turn off automatic gain
sensor.set_auto_whitebal(False) #Turn off white balance.
sensor.set_auto_exposure(False,16777) #Set exposure, need to be changed.
```

The fruit and vegetable management in the system background management module can add fruit and vegetable type, production address, ripe time, etc. User management can query user information,

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add users, modify user information, and delete users. Manage orders can query orders, modify orders, and delete orders. In the user registration of the picking management module, the registered user needs to add the user name, user password, user phone number, etc. User login can enable users to log in to the management page with a user name and password for online picking, online order placement, online consultation, etc. The surface code is part of the main program.

2.4.1 Part of the code of the database configuration program

```
Database={
'Default':{
    'Engine':'djano.db.backends.sqlite3',
'Name':os.path.join(base_dir,'db.sqlte3'),
}}
```

2.4.2 Section code of user registration procedure

```
Def reg(request):
If request.session.has_key("name682");
Return httpresponseredirect("/")
If request.method=="post";
Name=request.post["name"]
Pass=request.post["pass"]
Phone=request.post["phone"]
Userms.objects.reate(name=name,pass=pass,phone=phone)
Return httpresponse("Registered successfully")
Return reder(request,"reg.html")
```

2.4.3 Part of the user login program code

```
Def login (request):
If request.session.has_key("name682");
Return httpresponseredirect("/")
If request.method=="post":
Name=request.post["name"]
Pass=request.post["pass"]
islogin=usermsg.objects.filter(name_exact=name,pass_exact=pass)
if islogin:
request.session["name682"]=name
return httpresponseredirect("/")
else:
return httpresponse("Login failed")
return render(request,"login.html")
```

2.5 The final effect of the system

Finally, the system can accurately monitor the maturity of fruits and vegetables, and the system uses smart sensor cameras to collect images. The system can receive data through mobile phones and computers, monitor the condition of fruits and vegetables in an unmanned environment, and transmit the measured data to the mobile phone or computer that controls the system. This system realizes unmanned collection of fruit and vegetable data, which can better monitor the maturity of fruits and vegetables, and recommend picking time according to the ripening cycle of fruits and vegetables. Users can check the time to pick fruits and vegetables in different regions online, realize remote picking and

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determine the delivery method, which reduces the cost to a certain extent, reduces the work pressure of the fruit person, and can watch the fruit from time to time, which can effectively prevent the fruit and vegetable from being damaged. Loss. It has brought great convenience to people's lives, and it is convenient for fruit growers to check the ripening situation at any time and to sell mature fruits and vegetables in time, so that the income of fruit growers is guaranteed and people's living standards are improved.

3. Conclusion

This system mainly collects existing data to develop the design of ecological picking identification system. Use matlab, AI recognition technology, WEB development technology, database storage technology to complete the online ecological picking system design. The template library is established through image acquisition, and the computer is used to analyze and understand the image. First, the AI-based smart sensor camera is used to collect images, and the preprocessed images are image-enhanced to extract important information. The use of technology is currently relatively advanced in visual recognition, with good generalizability and feasibility.

The fruits and vegetables can be seen without checking their maturity. Its application will bring great convenience to people's lives, and make people's material life and spiritual needs further obtain a sense of happiness and satisfaction. Users can watch the growth of fruits and vegetables remotely. Users can reserve picking time online, specify the transportation method of the harvested vegetables, satisfy users' online query, picking, receiving and other online picking operations, and perfectly solve the restrictions on picking regions, which is of great significance for expanding the picking market.

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References

[1] Zhang Zhiyong, Zhang Xinghai, Song Yang, Tang Yonglin, Zhang Zhigang(2018). Based on mobile 4G smart SAL ecosystem model research [J]. Journal of Changchun Normal University, vol.37, no.02, pp. 29-34.

[2] Zhang Zhigang, Zhang Zhiyong(2019). Simulation of automatic detection of weak signals in wireless networks under the background of chaos. Computer simulation.

[3] Zhao Wenmin(2012).Research on image recognition of mature apples and their pose acquisition [D]. Nanjing Agricultural University.

[4] Zhang Zhigang, Song Yang, Zhang Zhiyong(2018). Research on the teaching platform based on Android embedded system development course. Digital World.

[5] Liu Jizhan(2017).Analysis of the research progress of greenhouse picking robot technology [J]. Journal of Agricultural Machinery. No.12.

[6] Gao Ning (2020). Research on Matlab/Simulink model componentization technology for semi-physical simulation system [D]. Zhejiang Sci-Tech University.