Design and Implementation of WeChat Robot Based on Machine Learning

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***Abstract*—In order to build an efficient WeChat use-assisted management system and improve the use efficiency, a novel type of application robot based on machine learning is proposed. The proposed system integrates information acquisition module, through machine learning autonomous learning-group-rule module. The simulation management of WeChat group module, and the user image content analysis module respectively. After the user introduces the management system, the proposed system automatically analyzes the group management rules, and conducts trial operations, constantly corrects the learned rules, and finally simulates the group management behavior, and helps the user to identify the picture content according to the user's own choice. Experiments demonstrate that the application robot has achieved high efficiency and the results demonstrate that the application of the proposed system can catch the needs of the user's daily use.**

Keywords - Machine Learning; Image Recognition; WeChat Robot System;

I. INTRODUCTION

The development of information technology has a revolutionary impact on production and life. It combines information technology and management systems to achieve high work efficiency. How to combine management work with information technology and improve management efficiency have become the focus of attention [2]. For the WeChat group, the traditional management model requires a lot of labor and time [3]. In order to improve the management efficiency of WeChat group, reference [4] proposes a management system based on machine learning. In order to attract users and popularize the application, reference [5] proposes an interest recommendation system. In order to better fit the interests of users, reference [6] proposes a system for managing user social networks and responding to user contacts. In order to optimize the user experience, reference [7] proposes a function to distinguish the contents of a picture.

Machine learning refers to the use of data or previous experience to optimize the performance standards of computer programs [8]. Machine learning has been applied in many fields such as industry [9] and transportation [10] home and abroad, and has achieved very good results. In 2016, Alpha Dog defeated the Go champion Li Shishi using deep learning technology, and artificial intelligence ushered in a new peak [11]. In the study of machine learning, many companies have achieved good results, such as Google's open source machine learning system TensorFlow [12], Amazon's machine learning based product demand analysis probabilistic model [13].

Based on past work [14][15], we combined management rules with WeChat groups and established an efficient user management system based on machine learning to improve the efficiency of daily management of WeChat groups. In the second part, we introduced the proposed system architecture. The third section gives a detailed description of each module. The fourth part gives an effective service distribution mechanism. The fifth part gives the operation flow of the proposed system.

II. SYSTEM ARCHITECTURE

The proposed system has four modules: information acquisition module, self-learning group rule module through machine learning, simulation management module, and image recognition module. The first module, with the function of WeChat group information acquisition, obtains information by using a python-packaged web-based WeChat communication protocol-based library. The second module, with the function of self-learning group rule, analyzes the data in the group through machine learning to derive group management rules. The third module, with the function of simulation management WeChat group, conducts trial run through the training group rules and constantly modifies the learned rules, and finally simulates the group management behavior. The last module, with the function of user image recognition, helps the user to distinguish the picture content according to the user's own choice, converts the valid information in the picture into text, and facilitates the user's operation.

The proposed system is a creative system with two key components. The first key section focuses on machine learning analysis group rules and provides service of simulating group management behavior. The second key part focuses on the recognition of image information in the user group, and extracts effective information for the user. Figure 1 demonstrates the architecture of the robot system.

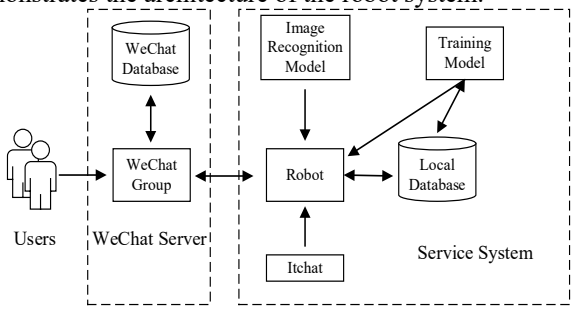

Figure1 System Architecture

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III. SYSTEM MODULE DETAILS

The information acquisition module is the basis of the proposed system. In this module we will obtain the information in the WeChat, we obtain the information through the interface provided by the third party, and carry out the next operation on the obtained information to provide the basis for the subsequent series of operations. In this section, we will discuss information acquisition methods. Figure 2 shows the architecture of the information acquisition module.

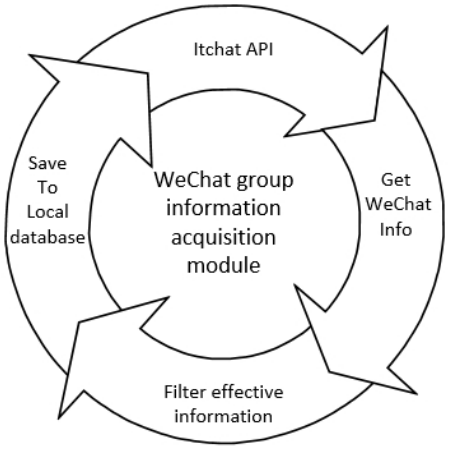

Figure2 Information Acquisition Module Architecture

As can be seen from the figure, the information acquisition module can be divided into the following four parts:

- Itchat API login. This part refers to using python's web-based WeChat communication protocol packaged function library. Through API calls, you can simulate interaction with WeChat's users.

- Get WeChat information. This part is the core part of this module. The collecting information generated in the user group, where the proposed system is located, for processing. Filter out valid information. This part of the function is to deal with the data has been collected, reduces the impact of invalid data on the proposed system after the function.

- Save to local database. This section stores the processed data in the local database to prepare for the next functional module.

Autonomous learning group rules module and simulation management module are the core of the robot system. This section analyzes the acquired group information and conducts training in a combination of semi-supervised learning and unsupervised learning. A group of data such as group information active time, group announcement, group information, and group management behavior use as parameters to learn group management. Rules, and under the supervision of the user to conduct trial operations within the group, to detect the accuracy of the management behavior learned. If the actual deviation is large, the accuracy of the learned rule adjust in time, and the user can operate autonomously after confirming. The simulated management of the WeChat group provides users with great convenience. The above two-part architecture diagram shows in Figure 3.

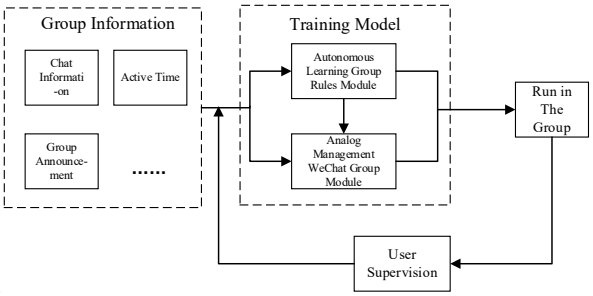

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Figure3 Autonomous operating architecture

The image recognition module is an important part of the proposed system. The robot system provides the option of image recognition to help the user to operate more autonomously, so that the user can quickly. The proposed system uses Open-CV, OCR, face ++ and other related technologies to identify image information, such as identifying license plate, facial and ID cards, etc., to help the user to extract text information from the group diagram and to facilitate the operation. Improve user efficiency. The robot system can identify the image mainly into two parts. One is to use a third party image recognition library to identify the image by calling the interface of the recognition library. The second method is to customize some image recognition libraries as needed, and the user can perform simple image classification and recognition.

Figure 4 demonstrates the license plate details identified using OCR technology.

Figure 5 demonstrates the classification of picture content using the Object Detection technology of Tensor Flow. The experiment through the collection of 1,000 data collected in one month as a data set. First, we labeled the steps we wanted to identify, and then we trained with the Neural Network of Object Detection. Figure 5 shows a data set that uses 10,000 iterations. The result of the test
Users can clearly understand all the categories that appear in the image.

Figure4 License Plate Recognition

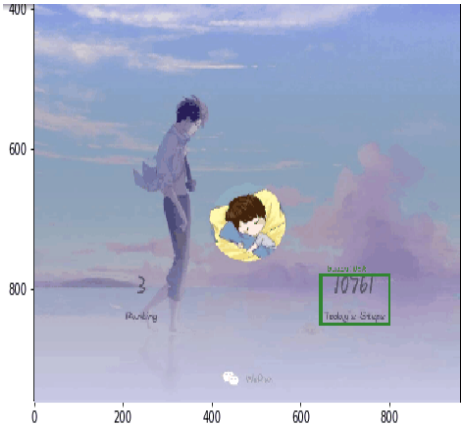

Figure5 Step Identification

IV. Efficient Service Ervice Allocation Mechanism

Each WeChat robot system can have multiple instances. When the subsystem enters the target group, the instance is divided into a separate Docker container. The service user submits the request to the overall system. The registry checks the health of the service. The proposed system provide services to users by forwarding the judged requests to normal instances. This solution solves the problem of system interruption caused by system overload and interruption of the load balancing process. This figure demonstrates this pattern.

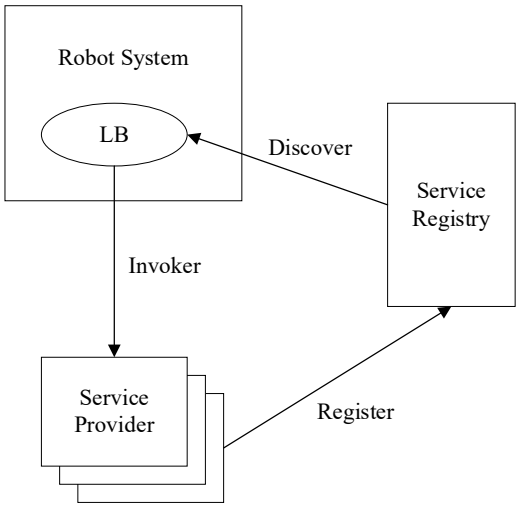

Figure6 Efficient Service Allocation Mechanism

The judgment mechanism used by this system ensures higher availability and flexibility of the service. When the proposed system starts up, it enters the target group for the first time and sends a registration request to the overall system after confirmation by the user. Then, it detects whether the heartbeat mechanism has stopped the service. If the service fails to connect for three times, the service will fail and avoid the use of the factor system. The waste of resources caused by continuing to occupy services has been successfully resolved so that more people can use limited service systems more efficiently and reasonably.

V. System Operation Flow Chart

In order to make it easy for users to operate the robot system, we have developed mobile and pc-side applications. After the user successfully installs the robot system, the proposed system will automatically run. After the proposed system runs successfully, the user can choose whether to execute the functions contained in the proposed system.

Figure 7 shows the operation flow view of the robot system.

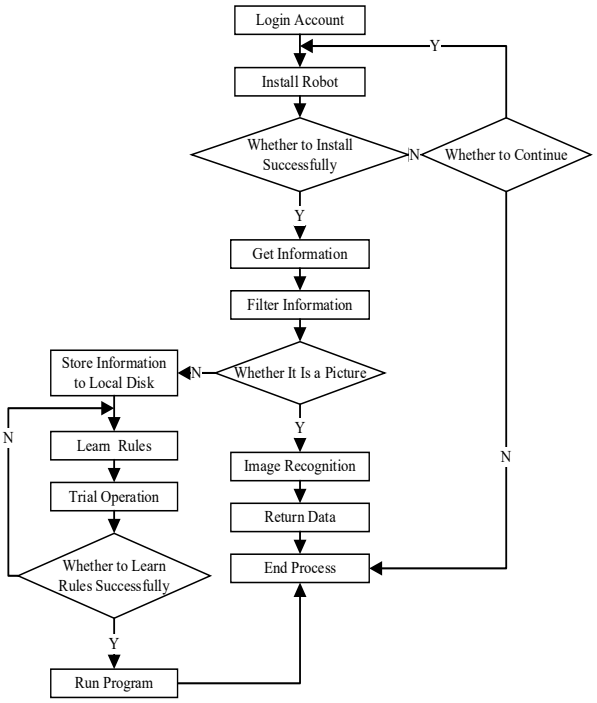

Figure7 System Flow View

As shown in Figure 7, the entire process has the following ten steps:

1) Install the robot. The robot must be installed before the *proposed* system is used. Please go to step 2.

2) Whether the installation was successful. If the installation is successful, go to step 4, otherwise go to step 3.

3) Whether to continue. If the user fails to install, choose whether to continue with the installation. If yes, go to step 1, otherwise, go to step 14.

4) Collect data. After successful installation, collect data in the target group. After collecting the data, go to step 5.

5) Filter the data. The collected data must be initially screened. Please go to step 6.

6) Determine if it is a picture. If yes, go to step 7, otherwise go to step 9.

7) Image recognition. Recognize the content of the received image and convert it into readable data. After the conversion is successful, go to step 8.

8) Return data. The converted readable data is returned to the target group. After successful return, go to step 14.

9) Save the data locally. If it is not picture data, save the processed data to the local database, and then go to step 10.

10) Learning rules. Use the machine learning method to analyze the data saved locally and learn the rules of the target group autonomously. Then go to step 11.

11) Test run. After learning the rules, perform trial run in the target group to avoid learning mistakes. Then go to step 12.

12) Whether to learn group rules successfully. The user observes whether the robot system has successfully learned the rules of the target group. If yes, go to step 13. Otherwise, go to step 10.

13) Run the *proposed* system. After successful learning, run directly within the target group. Then go to step 14.

14) End the *proposed* system operation.

Figure 7 shows the core technology part of the entire system, which can be divided into two parts: autonomous learning and image recognition. The self-learning part may result in incorrect learning rules due to less information obtained from the target group, and the user may modify the basic group rules provided by the proposed system. The model of management rules provided by this system, which is in view of the analysis of a large number of WeChat groups. There may be differences in the management behavior of the target user group. The user can solve this problem after waiting for the proposed system to learn enough data.

VI. CONCLUSIONS

WeChat development and image recognition technology with open source provide convenient technical support for the proposed system. We built a WeChat robot system based on machine learning and image recognition to achieve the expansion of WeChat functions and improve user efficiency and convenience. At the same time, we can lay a solid foundation for the better development of the proposed system. Through the analysis of this paper, it is evident that the robot system is practical in the application of improving the user's efficiency, and has great development prospects.

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