User-Manual

1. Writing purpose:

Inform users about the functions and precautions provided by the vision-based football match analysis system.

Explain the meaning of some result parameters in the record interface of the applet.

Help users to figure out the whole process of using the applet to analysis football video

## 2. How to Use the Application

Preparation:
The Wechat application, which is a product of Tencent. Vision: 7.0.12
A logical and available WeChat account.

2.1 Account Operation:
Login
On the "chats" interface of WeChat, user can click the search bar to search the "football video analysis" applet, which is a kind of Mini-program. Click the top option. If it is the first time for the user to login the applet, the user is supposed to click the avatar and green "allow" button will appear on the screen, click it to allow the applet obtain user's name, profile photo, region and gender. This is aimed to allow users to upload local videos to the front-end of the applet. (this is how to use of normal WeChat mini program, since this app have not been uploaded and established to public as formal one, you only can execute on personal computer with WeChat Development tools.)
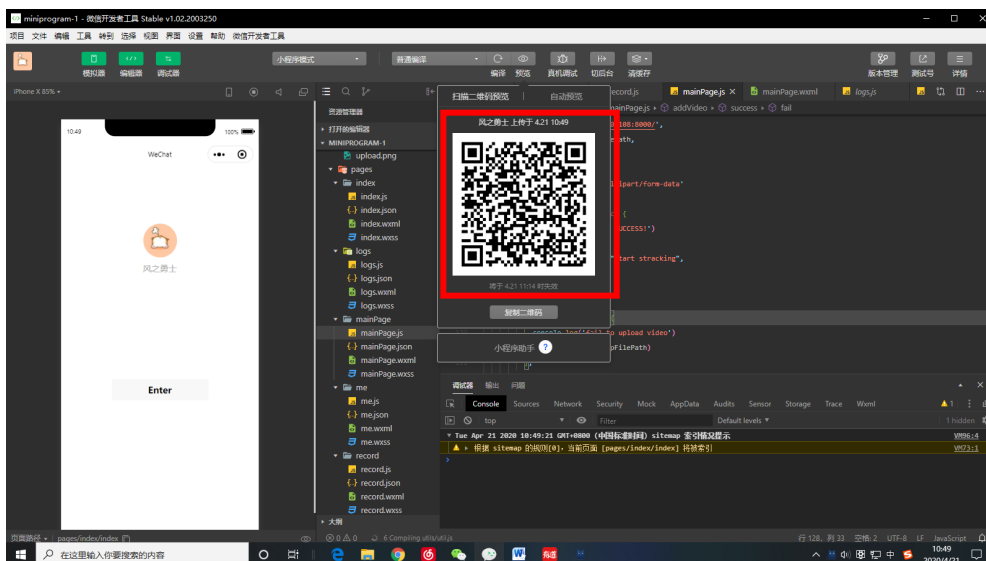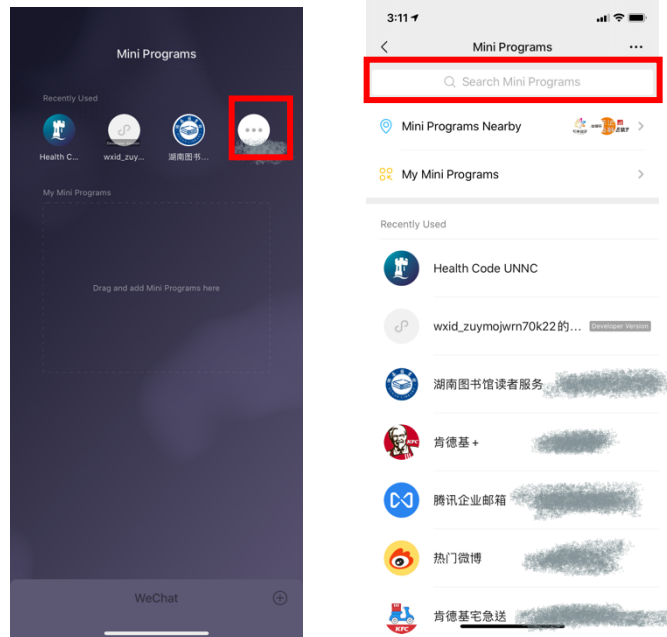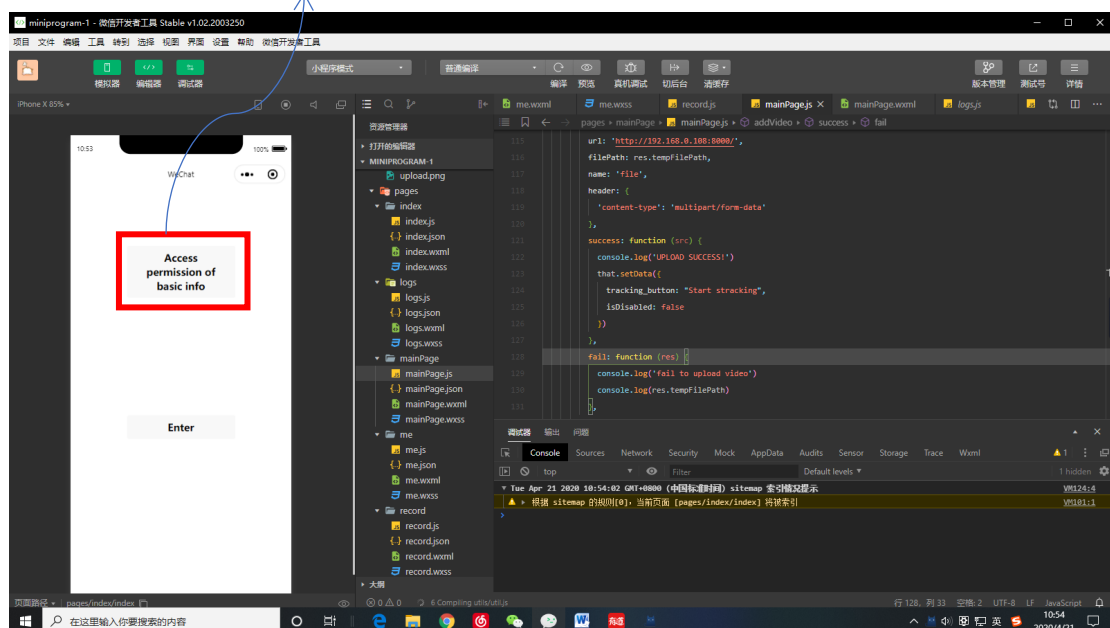
Search the Mini Program

2.2 Index page:

The user can click "Enter" button to enter the applet directly. In the first time, the user will be asked for accessing information of WeChat account. The mini program can always access account later on once being authorized.

Click button to give authorization

Special illustration:

There is no need to concern register or change the password of account. The applet is related to the WeChat application. Therefore, the account is internally linked, only if an available WeChat account can be used in WeChat applet. Besides, the basic account operation can be achieved in the "Me" interface of WeChat.

2.3   User Interface:
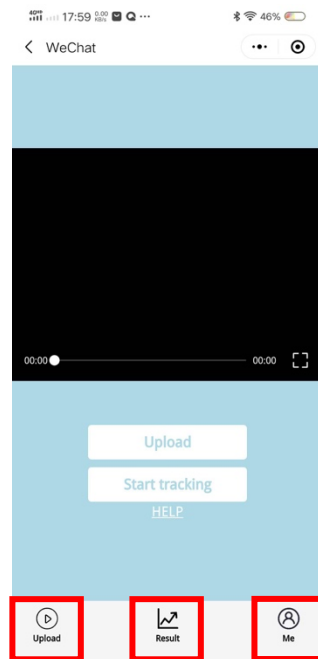
Upload Page:

In the upload interface, there are three buttons for operation (show above). Firstly, user can click "Upload" button to choose a local video from local album or record a new video. After choosing, in the album page, user click the green "send" button to send the video to applet. Then, the video is shown on the screen and a rectangle can be dragged from the upper left corner of the video. Next, the user can click the "HELP" button to know about how to move the frame by one single finger and adjust size of the frame with two fingers to let the rectangle cover one specific football player. Finally, user click the "Start tracking" button to start the tracking process. If the user wants to track a new video, first click "Upload" to upload the new video, then click "start tracking" to re-analyze the new video (the rectangle will be in the place where the old video was set)

Note: As long as moving the rectangle to choose the target before starting tracking is feasible.

If the tracking is successful, there will be a new video to replace the old video (in the new video, people are tracked in real time by the rectangle)- this functionalities only works on when simulating on smartphone but not work on PC.


Result Page:

User click the "Result" button to jump to the result interface to check out the result of analysis. Then click the "show" button. There will be four different ways to show the data: histogram, line chart, pie chart, ring chart. And there are four actions (integer 0: noball 1: passing 2: shooting 3: dribbling) shown in different kinds of chart. User can see the result clearly and intuitionally.
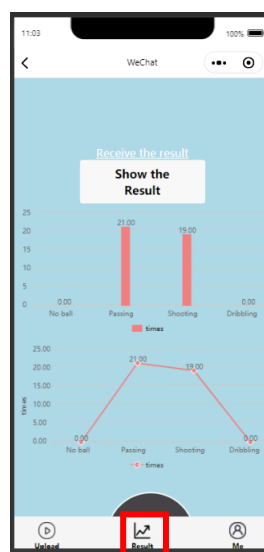
Me Page:

In this interface, users can check the avatar and nickname of their own. The introductions of group 14 and this applet are also shown under the white line.
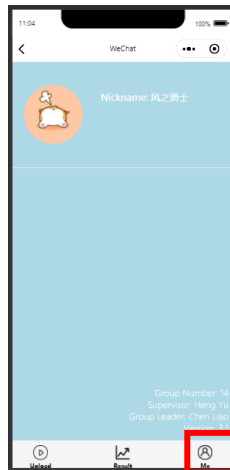
2.4   The whole process of analyzing a football video:

User opens WeChat application, find the mini-program and login it. Then, allow access to local albums and choose one video from it. Next, adjust position and size of the rectangle, let the rectangle cover target player. Click "Start tracking" button. The result of analysis will show on the "Result" interface shortly. If the user wants to reanalyze the old video or analyze a new video, user should reupload a video and repeat the above operations.

Note: Due to the system's own bug, applet ran on IOS system can limit the video time in 60s, however, in Android system, the time of video can't be limited.

3.   How to Install the Application:

The entire system is divided into two parts, which is required to install on separated devices.

Preparations: One computer with Windows system (or Mac OS) running UI, one computer with Linux system as backend, one Local Area Network.

3.1   Install backend:

Firstly, your computer with Linux system should be equipped with conda environment (if not, install conda first).

Then, activate conda environment (you may use command "conda activate")

Install package grp_backend.zip and decompress the package

- Setup environment for program SiamMask(you may refer to instructions from: https://github.com/foolwood/SiamMask)
  ```
  cd grp_backend/SiamMask
  export SiamMask=$PWD
  ```
  setup python environment:
  ```
  conda create -n siammask python=3.6
  source activate siammask
  pip install -r requirements.txt
  bash make.sh
  ```
  Add the project to your PYTHONPATH
  ```
  export PYTHONPATH=$PWD:$PYTHONPATH
  ```
  Download the SiamMask model
  ```
  cd $SiamMask/experiments/siammask_sharp
  wget http://www.robots.ox.ac.uk/~qwang/SiamMask_VOT.pth
  wget http://www.robots.ox.ac.uk/~qwang/SiamMask_DAVIS.pth
  ```

Now you should be able to run sample(demo.py) of SiamMask (not the whole program)
```
cd $SiamMask/experiments/siammask_sharp
export PYTHONPATH=$PWD:$PYTHONPATH
python ../../tools/demo.py --resume SiamMask_DAVIS.pth --config config_davis.json
```

- Running the sever
  Go to file of sever
  ```
  cd ../../../Django_sever
  ```
  Execute sever:
  ```
  Python3 manage.py runsever 0.0.0.0:8000
  ```

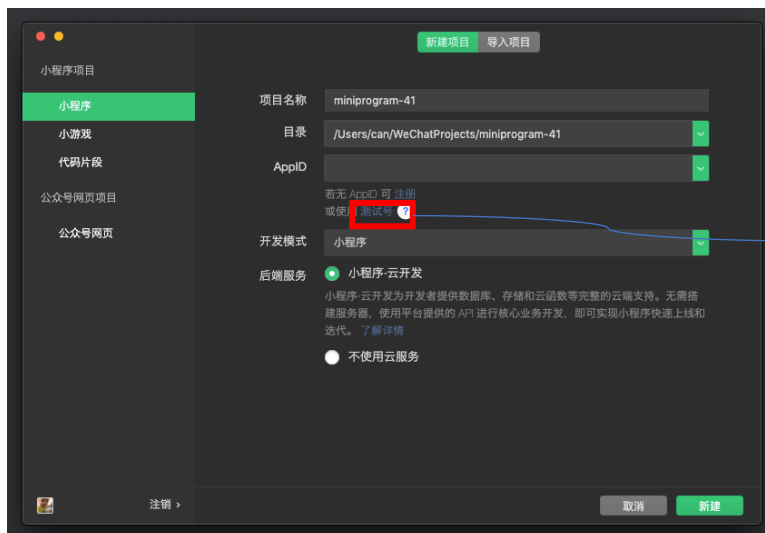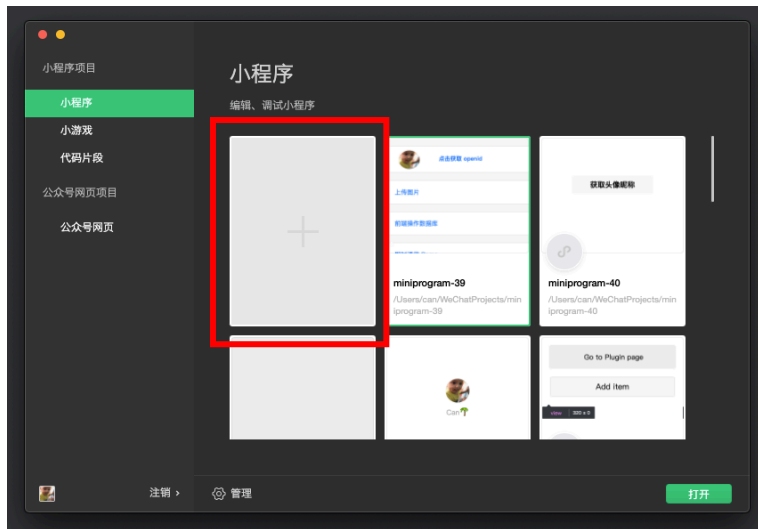## 3.2 Setup frontend:

The whole frontend is developed on Windows/macOS (need another computer)

Firstly, install WeChat Development tool which is available at:

https://developers.weixin.qq.com/miniprogram/en/dev/devtools/stable.html

Then download grp_frontend.zip and decompose the package

Open the WeChat Development tool and import project:

Please use testing number for AppID

After entering the frontend code, please change the IP address inside code:

From miniprogram/pages/MainPage/MainPage.js: line 115, line 185, line 199

From miniprogram/pages/record/record.js: line 105

You should replace the IP address with the IP address of your backend sever (you may use "ifconfig -a" to check IP in Linux sever.)
Be careful the two computers are placed within same LAN!
After these operations, you should successfully execute the program.

4. How to Use for Admin

4.1 How to update performance of classification net

Generally, to update the network, the administrator needs to modify the training dataset, train the network and replace the model. The training data is under the folder '\dataset', the administrator could replace or add images into each of the categories to alter the dataset for a better training result. However, be aware that the folder structure and naming within the dataset should never be modified. Additionally, images should be uniform 50*50 gray-scale ones within .JPG format.

For retraining the network, run 'train.py' individually and there will be a model file named 'net.pkl' appearing in the same folder with the script. The administrator could monitor the training process with the updated information in console.

```
Epoch: 7 | train loss: 0.5125 | test accuracy: 0.700000
Epoch: 7 | train loss: 0.5125 | test accuracy: 0.540000
Epoch: 7 | train loss: 0.5125 | test accuracy: 0.580000
Epoch: 7 | train loss: 0.5125 | test accuracy: 0.620690
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.700000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.540000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.680000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.660000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.560000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.540000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.720000
Epoch: 8 | train loss: 0.4792 | test accuracy: 0.724138
Epoch: 8 | train loss: 0.4475 | test accuracy: 0.500000
Epoch: 8 | train loss: 0.4475 | test accuracy: 0.600000
Epoch: 8 | train loss: 0.4475 | test accuracy: 0.600000
Epoch: 8 | train loss: 0.4475 | test accuracy: 0.600000
Epoch: 8 | train loss: 0.4475 | test accuracy: 0.720000
```

The administrator could copy or cut this newly trained model file and supersede the original model file in grp_backend/SiamMask/tools/net.kpl, thus the software will use the mew model for classification the next time it runs.