

Implementing Cascade Classifier In Android Application “Find Marks”

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Abstract - Nowadays going through other places is easier to do. Explore new area is quite common activities by every people since they have sense to know about the environment or situation around them or just curiosity about somewhere else they didn't know yet. People have different ability to adapt and ways to know how the environment around them. Not all people feeling easy with their new environment and socialize with local people. This research intends to implement object detection as one of feature from computer vision in android application. This application also will assist users how to training image for cascade classifier. User will be able to do object detection using built in Android smartphone camera to receive direction to some place or building from provided marker or logo. It also gives user information about the current place.

I. INTRODUCTION

In this era, technology becomes inseparable in human life. Every time our technology always developing and move forward to satisfy our desire to life better than before. It is because technology used to fill people needs that suitable with time to time. Many invention and innovation make the growth up significantly. Unconsciously it affects the human's behavior, almost all activity influenced by technology. For example, nowadays people like to text his friends and tell if he arrive in front of their house, not by calling them from the outside or try to knock the door like people used to be a decade ago.

The center of attention about this evolving is mobile phone. For several years ago, the mobile phone known is feature phone, and then evolving into a mobile phone that can do what computer most do, and people call it now as smartphone because the control is vast and also can run several tasks from computer in our hand. It caused feature phone becomes outdated even though some people still have it for a reason.

Smartphone gives many facility comes in handy. This also supported by applications that exist in smartphone. So many applications created now to help people with their smartphone. And one of the

trends now is computer vision related application. This technology gives us interactive touch in our smartphone's screen. Using planted camera in smartphone as the sensory image then show the output on the screen.

Not only smartphone, some of corporation had research for computer vision technology to apply it in other devices or gadgets. Anyone can found games and graphic entertainment using VR (Virtual Reality), and then robot with object detection planted on it to recognize specific things using camera. The trends in smartphone computer vision now are Augmented Reality and face detection. Developer compete each other to product greatest mobile apps that can bring computer vision technology in our hand.

Cascading classifiers is one of them, as a part from computer vision technology, it used a file cascade as object detector. This technology has developed by OpenCV, even user can create cascade file by their self with training image that would be explained in next chapter.

The researcher takes this advantage to create an application for helping people to investigate and explore new places around with implementing cascade classifier as the object detection on android application. My application would be detect specific marker that comes from me and would be placed around President University region. If the application detects that, user smartphone device gives direction to other places which is near to the object detected before. It should guide the user with some interface on the device's screen.

This research will be developed in ADT (Android Development Tool) Eclipse bundle with Java Language, this application will be provided the following features:

1. Detect a marker as the object.
2. Show arrows as the guide to other places.
3. Running well in Android operating system

4. Give some description about the place.

Some limitations of my application are listed below:

1. Not supported for smartphone without built in camera.
2. The Application system can only be used on device that based on Android Operating System.
3. Jelly Bean version as the minimal requirement.
4. If the brightness not enough, the object may not detected or miss detection.
5. Cannot be used in noise place.
6. The focus on this research is around the object detection things, how to detect the marker around user and give information with several directions that occur on the screen and of course description also. For appearance of the application would be simple to see and user friendly.

II. METHOD

This application will be developed using Rapid Application Development (RAD). The advantages of RAD are speed, reduced development cost, and active user involvement in the development process. RAD is a software development process model that emphasizes an extremely short development cycle.

In RAD, the development process is started with analysis and quick design. RAD also gives a better turnaround time of software product. After that, the development process is fell into the prototype cycles. The cycle is repeated iteratively until the system is built, then it is moved through the next stage which system testing and deployment.

The development of this application is focused on implementation of object detection to Android smartphone. How this method can help user to detect specific image. In this case, marker image is a reference to the existence of the current user. In addition to writing code for android application, the development will also use desktop or personal computer to create cascade.xml file by training image so that the result later can apply it to android application. As an Information Technology students, the writer already got Computer Vision subject and had try how to training image with OpenCV even though the result feels not satisfy.

III. APPLICATION PREVIEW

This section is giving the application preview of its implementation. This section will include the use

case and some application screenshots. Figure 3.1 will shows the use case diagram of the application. The use case includes “Start Program”, “Display Camera View”, “Mask Background”, “Object Detected”, “Signpost Arrows” and “Get Information”.

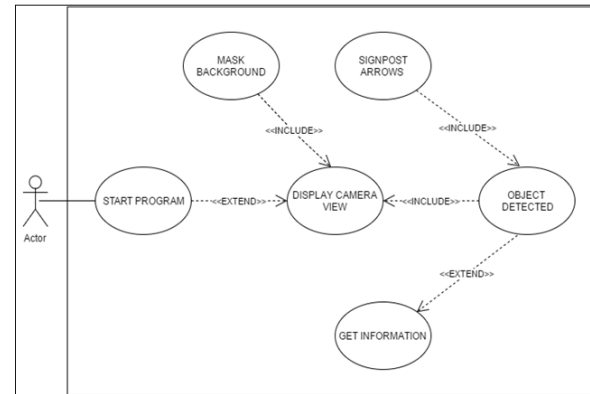


Figure 3.1 Use Case Diagram

Figure 3.2 show the front page layout, this layout was generated from text configuration in xml file. This is the first layout user meets after running the application by touching icon launcher in android smartphone application menu. Each button in this layout will direct users to main activity of the application and to exit from the program. Start button will trigger to main activity of the application and Exit button obviously is for close the program. This front layout has background picture to give identity for application, therefore direction related picture was chosen to put on this layout. This layout has no animation and would be leave some space on the right side to main button of android smartphone.



Figure 3.2 Front Page User Interface Layout

Looking at figure 3.3, this is where the main function of application begins. Black box on the center layout is camera view after applying mask into it. The white region is the mask. It leaves small ratio for camera view in order to reduce fps drop. Camera view had been set as dynamic feature, in other word it follows the size of android smartphone screen. In this box also, marker would be recognized. Blue text on top left is fps indicator for camera view and it will change sustainably. Then this layout has Info button on the right side, it is the trigger to show popwindow dialog on the screen. It uses to get info description of building or the place.

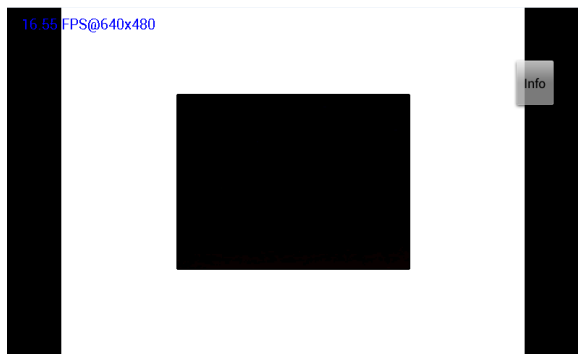


Figure 3.3 Main Activity User Interface

Looking at figure 3.4, this is where info description being given after the object gets detected. Pop up window would be showed right after you touch info button. If no object detected before, the description will be given is "Please detect the marker". But if the application once detected an object, user can get the info description depends on what the object is.

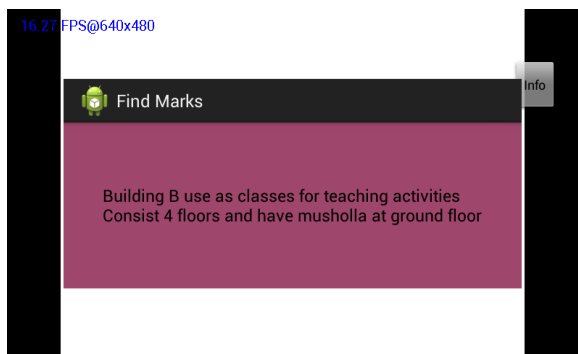


Figure 3.4 Popwindow layout

IV. EXPERIMENTAL RESULTS

To check the functionalities of the system have been developed is working, a system testing is done. This testing process will check the application capability to detect the hand gesture

showed by the user towards the camera. Then, the application must be able to control the mouse according to the user will.

System testing is done by applying scenario for the application. The testing will compare the expected result and the result obtained after the testing. The goal for this testing is to validate that the application is able to deliver the requirement in the system design and development.

This section contains Tables which shows the testing scenarios. Testing scenario describes the activities which have to be checked in order to prove that the system works properly. The testing scenario will be divided into two sections, which are Object Recognition Section and Info Description Section. Object Recognition Section explains about any input using image and the recognition feature. Info Description Section explains if the application shows the right info according detected marker image.

a. Object Recognition Section

This section contains Table 4.1 which shows the testing scenarios, expected result and evaluation for Object Recognition.

Table 4.1 Object Recognition Evaluation

No.	Scenario	Expected Result	Evaluation
1.	Scans Building A marker image	System will change camera view mask into signpost arrow and draws rectangle to mark the marker image and specified it.	Success
2.	Scans Building B marker image	System will change camera view mask into signpost arrow and draws rectangle to mark the marker image and specified it.	Success
3.	Scans Student Housing marker image	System will change camera view mask into signpost arrow and draws rectangle to mark the	Success

		marker image and specified it.	
4.	Scans Clinic marker image	System will change camera view mask into signpost arrow and draws rectangle to mark the marker image and specified it.	Success
5	Scans City Walk marker image	System will change camera view mask into signpost arrow and draws rectangle to mark the marker image and specified it.	Success

b. Info Description Section

This section contains Table 6.2 which shows the testing scenarios, expected result and evaluation for Info Description

Table 4.1 Speech Recognition Section

No.	Scenario	Expected Result	Evaluation
1.	After detecting Building A marker image, user touch Info button.	System will shows information about Building A.	Success
2.	After detecting Building B marker image, user touch Info button.	System will shows information about Building B.	Success
3.	After detecting Student Housing marker image, user touch Info button.	System will shows information about Student Housing.	Success
4.	After detecting Clinic marker image, user touch Info button.	System will shows information about Clinic.	Success

5	After detecting City Walk marker image, user touch Info button.	System will shows information about City Walk.	Success

The expected result that showed in the table of scenario deliver the information that there are no errors appears in positive test for this application. However it can have some misdetection according the properties of frame image from video was suitable with cascade classifier xml file. It can only be proved if the actual result performs the same result with the expected.

The following figures show how the application should work. These figures are proves of image marker were successfully recognized and show the right information according the marker.

1. Building A

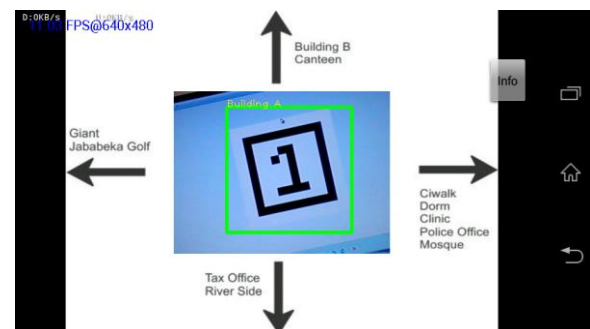


Figure 4.1 Building A Marker Detection

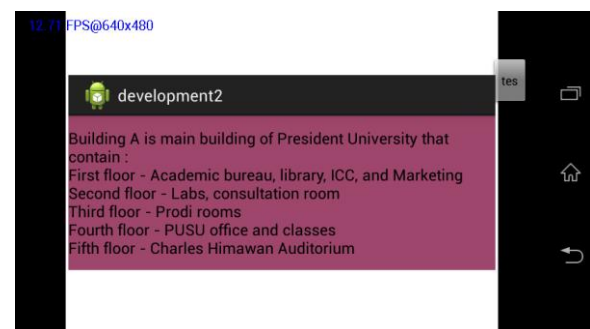


Figure 4.2 Building A Marker Information

2. Building B

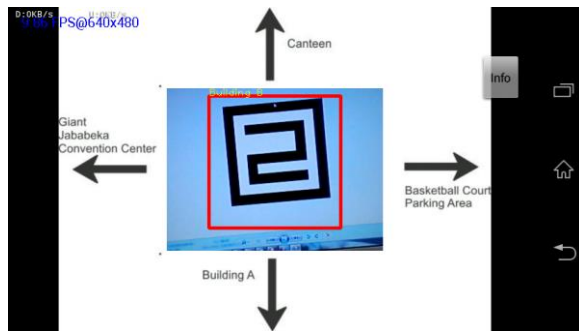


Figure 4.3 Building B Marker Detection

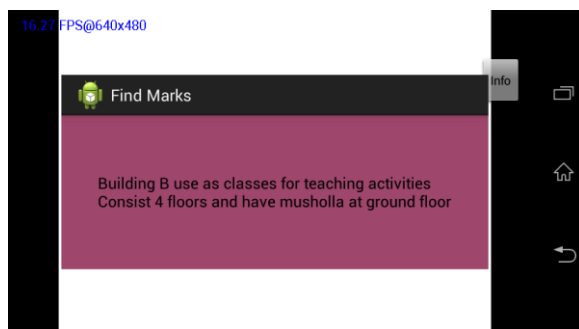


Figure 4.4 Building B Marker Information

V. CONCLUSION

Find Marks application has been developed. This application has covered the research objectives. A lot of efforts have been put into this application development. This application expects can help user in trouble with the President University region and object recognition with OpenCV. These are several conclusions gained from the research for more specific:

1. Find Marks application could recognize specified building around President University region.

2. Find Marks application could direct the user to some places around detected building.
3. Find Marks application could show simple information about detected building.
4. User could train the image independently for individual purpose

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