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Android Based Mobile Gaming Based on Web Page Content Imagery

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1. Introduction

In recent years, with rapid development of Web 2.0, the concept of combining Web and computer game is becoming very popular. Instead of common PC game, more and more people prefer to play online games or web page games, which provide higher interactivity and better user experience. Almost all the games are firmed in Web now and the game companies are thinking about how to fully utilize the platform provided by Web to improve the quality of the games. However, among the existing products, Web is only a method of connection or a running platform for the games. The information of Web has no relation with the games. The users have to choose between playing games and browsing information.

In addition, with development of mobile phone industry, many people prefer to play games by cellphone. Compared with PC games, cellphone games generally look simpler and are easier to be developed. Android, a comprehensive mobile software platform (Java + Linux Kernel) maintained by Google, is attracting more and more developers to use to create different kinds of mobile games. On the other hand, because of the constraints of mobile devices, mobile games cannot achieve too much layout goals. So, most developers would focus on the mode of the games when developing mobile games, even though some of these games look "simple". A kind of creative mode can make the games become more attractive.

This project creates an application for users that can convert the content of any web page into a game. Considering the popularity of Android phone and its openness, Android is chosen to be the platform to run the application. Also, this conversion app would create a joyful experience for users as they may feel that some web pages are very boring and hope them to become fun. Furthermore, the app will even offer the user an opportunity to view the content of Web by phone gaming. From this point of view, the game will be a new kind of browser for users. The purpose of this application is to create new mode of 'web game' that really integrates a game with web content and also to allow users to browse in enjoyable way.

2. General ideas

In the application, two types of games will be developed to implement the idea of "web page to game". One is called Puzzle Game which is developed by myself. But here, the game disarranges a screenshot of a web page in grids and the user can rearrange the picture by swapping the grids. If the user successfully gets the final result of the picture, the content of the web page can be achieved.

Another game is called Fighter Aircraft Game, which modifies the source code downloaded from the Internet to integrate the content of a web page into the game. The user will control the fighter aircraft and shoot the coming barriers that are constructed by different blocks of a web page (the web page are cut in accordance with the content). The user can read the web page through the coming objects. What's more, this game will be implemented in two different ways to get the content of a web page-Locally and Remotely. In local mode, the

content of a web page will be achieved by the mobile and utilized directly. In remote mode, the remote server will take the responsibility to download the content of the web page. The application will send the user's URL request to server (Apache+PHP) and it will return the blocks after processing. Following is the brief scheme:
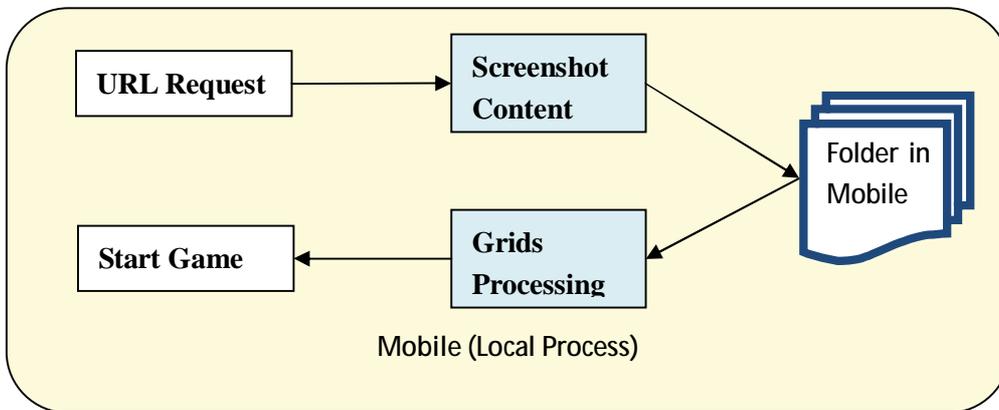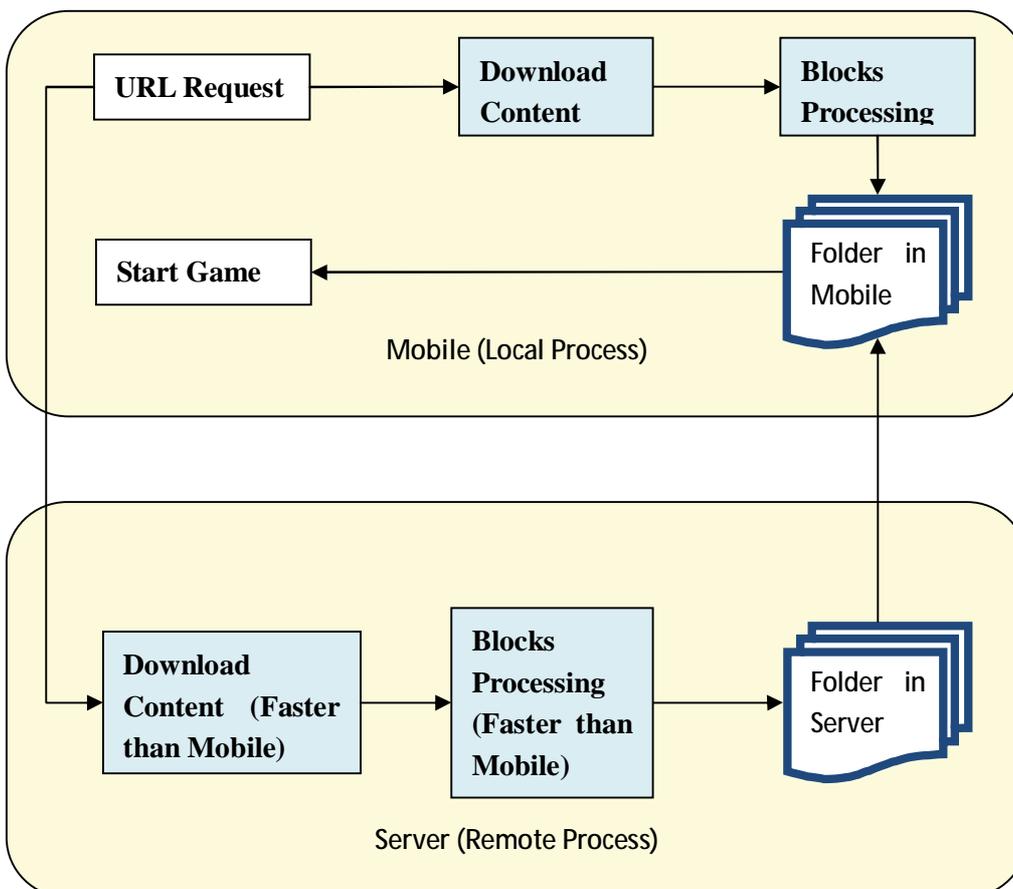

Figure 2.1 Local Mode in Puzzle Game

Figure 2.2 Combined Modes in fighter aircraft game

Game Name	Integration Method	Content Processing
Puzzle	Screenshot of whole page	Locally
Fighter Aircraft	Blocks of page	Locally/ Remotely

Figure 2.3 A comparison of the two games

3. Puzzle Game

3.1 Introduction

Puzzle game is a kind of game that is interesting and wide spread. Now, in mobile, some puzzle game applications allow users to retrieve any picture saved in their local mobile memory and put it into the game for fun. And the users can choose different difficulty levels. The higher difficulty level, more details of the picture may be involved and more grids may be constructed. The following are examples:
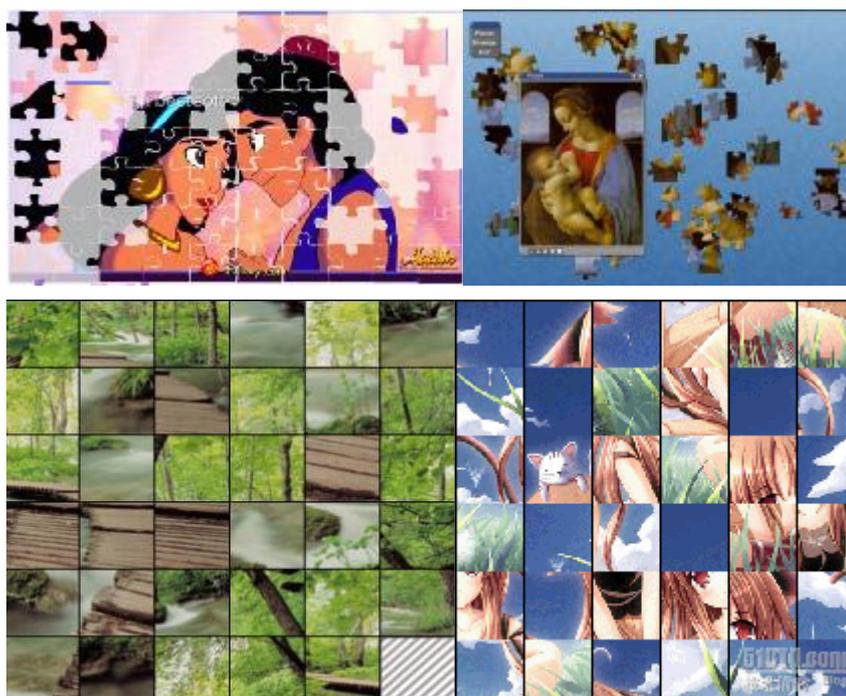

Figure 3.1 Puzzle Game Examples

The puzzle game in this project is developed based on the screenshot of the web page. After the application accesses to the web page and screenshots, it will run the algorithm to randomly arrange the order of the grids. The user needs to figure out the right order if he wants to get the information of the web page.

3.2 Design

When the game begins, it allows user to choose difficulty levels.

Two key functions should be realized in this game: screenshot and randomly arranging grids.

In the part of screenshot, the application needs to save the screenshot result in local memory for further use. Unwanted boundary should be cut out to make the result better. The result in memory would be deleted automatically when the user quits the application.

In the part of constructing grids, the screenshot result would be retrieved and adjusted to make it fits for displaying in the game. After retrieving, the application starts cutting the picture in grids and arranging them randomly. Besides, it includes additional function listening to the user's click behavior to allow rearranging.
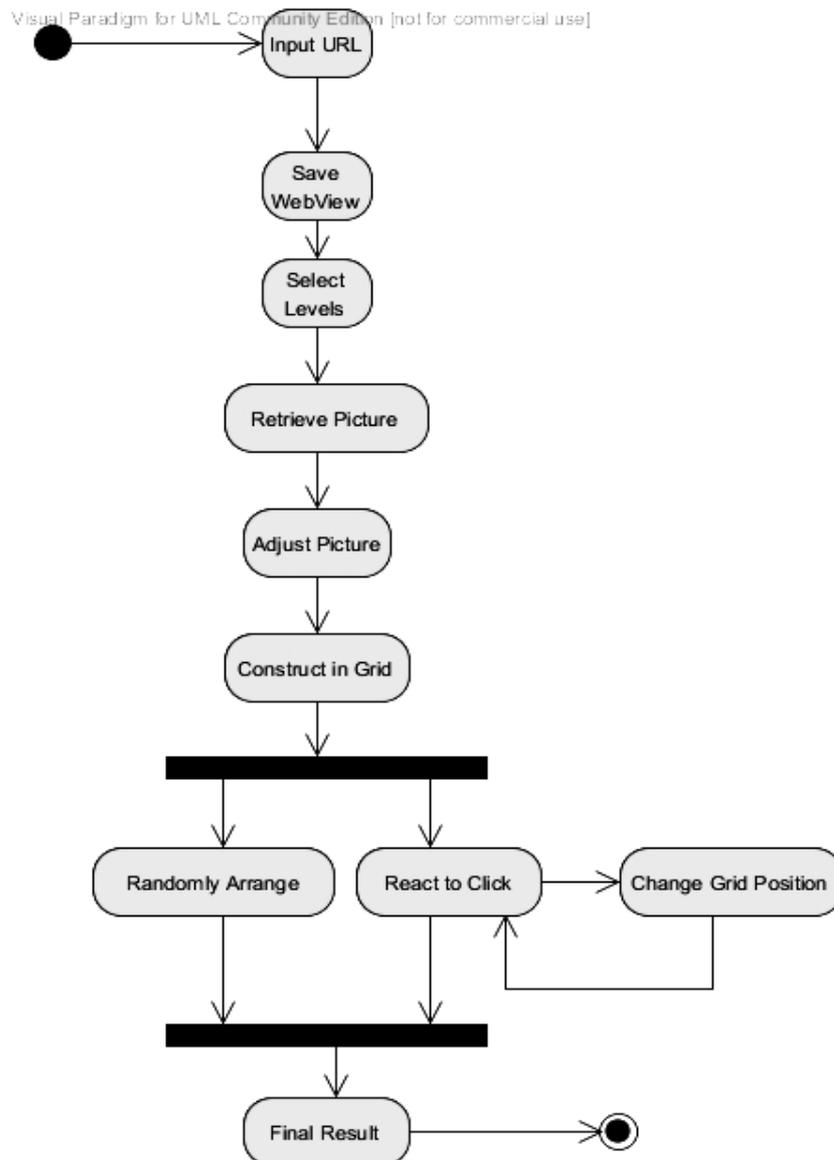

Figure 3.2 Activity Diagram of Puzzle Game

3.3 Implementation

Three fundamental activity classes and one layout are involved:

(1) MainActivity:
To receive the URL input

(2) GetimgFrWebview:
To launch webview to act as a container of the web page. After finishing loading web page, the activity screenshots and processes the layout of the picture. Finally, the picture named *webpage.jpg* saves in local memory (location: "/data/data/com.WebpageToGame/files/webpage.jpg").

(3) ShowimgFrWebview:
To retrieve the picture in memory. And the picture is adjusted to be compatible for different specifications. Then the picture will be cut in random grid and displayed. The gridview also needs to add onlick listener for invoking the method of changing grids position.

(4) Layout:
The layout of the game is one GridView object, to be deployed for the retrieved picture.

4. Fighter Aircraft Game

4.1 Introduction

Fighter aircraft game is traditional and always popular in different kinds of mobile platforms. The user of the game controls the aircraft to avoid or shoot the enemies and barriers. The user starts with lowest difficulty level and would battle against "boss" at the end of each level.

Although the game looks easy, it is relatively difficult to develop. First of all, the game involves too much objects, such as the aircraft, different barriers and enemies, score calculations, life, etc. Secondly, the developer should consider the aircraft and background's movement to figure out how the objects turn up. Last but not least, the reaction of shooting should be developed, including destroying enemies and barriers and summing up the score.

Figure 4.1 Fighter Aircraft Game Examples

In this project, I achieved and modified the open source code of one fighter aircraft game from Internet. The game is a simple version, the barriers and enemies in which are constructed by different size of blocks of a web page. The blocks are not screenshot, but the string and images read and cut by the application. Of course, the application calculates the scores for the user. The user can really read the content of web page while shooting the coming blocks. Furthermore, the application provides two modes to process the blocks: local and remote.

4.2 Design

After inputting URL, the user would choose either local mode or remote mode to processing the corresponding HTML.

Through local mode, the application will recognize the images and words respectively. The strings will divide into several blocks. Then these resources will save in local memory of the mobile. They will be passed to application for initialization. After that, the user can start playing the game.

Compared with the local mode, remote mode will pass the task of recognizing and processing HTML to the server with a prepared PHP file that will take the responsibility for the task. In this mode the resources will save in server and wait to be requested by the mobile end. The following steps would be similar to those in local mode.
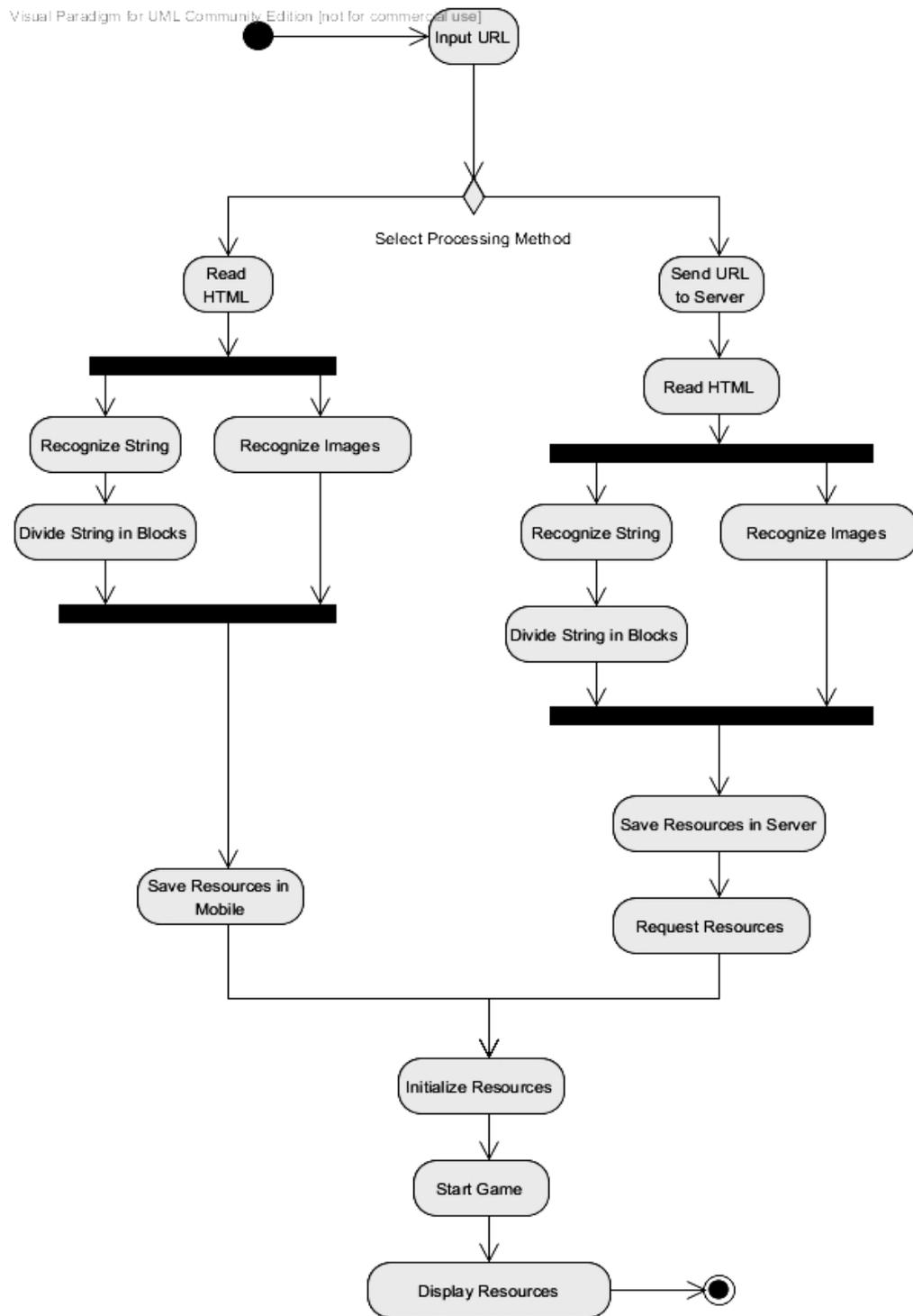
Figure 4.2 Activity Diagram of Fighter Aircraft Game

4.3 Implementation

Four types of classes in mobile: MainActivity, Game portal, Game tools, Layout. And PHP file in server.

(1) MainActivity:

The same file described in 3.3 (1). To receive the URL request and options of local/remote mode.

(2) Game portal:

For different modes, the application will invoke two game portal classes. One will read the HTML directly and utilize the Java library called JSoup, which can perfectly analyze the HTML, to extract the content and process the resources in blocks. The resources finally save in local memory. (location: /data/data/com.WebpageToGame/files/…)

Another portal will send the request to server and ask PHP to deal with the requirement.

(3) Game tools:

Game tools include some relatively stable resources, such as the dialog, user preference, messagebox, audio, etc. These tools will be used when the game is initialized.

(4) Layout:

Because of the complexity of the game, I choose Java class to define the layout instead of xml. The layout class includes defining the background, objects and their movement (including the retrieve the stored pictures), and initializing the different resources. In this part, the class will use the picture stored in local memory previously or in remote server, depending on which mode the user choose.

(5) Apache+PHP file:

After receiving the URL request, the PHP (PHP 5.0 or above) file in Server (Apache 2.0 or above) reads and analyzes the HTML. PHP will quickly download the strings and images. They will be processed into blocks and stored in a folder. When Apache receives request from mobile, it returns these resources.

5. Project Demonstration

In the main page of the application, there are one input text and three buttons. For the input text, the user should input the URL that contains 'http://'.

After inputting the URL, the user has several options for starting the game. The user can choose "Start AircraftGame Locally" and "Start AircraftGame Remotely PHP" for different mode of the fighter aircraft game. If the user wants to play puzzle game, he should firstly press the third button to screenshot the web page requested by the URL, and then he can start to play the game.
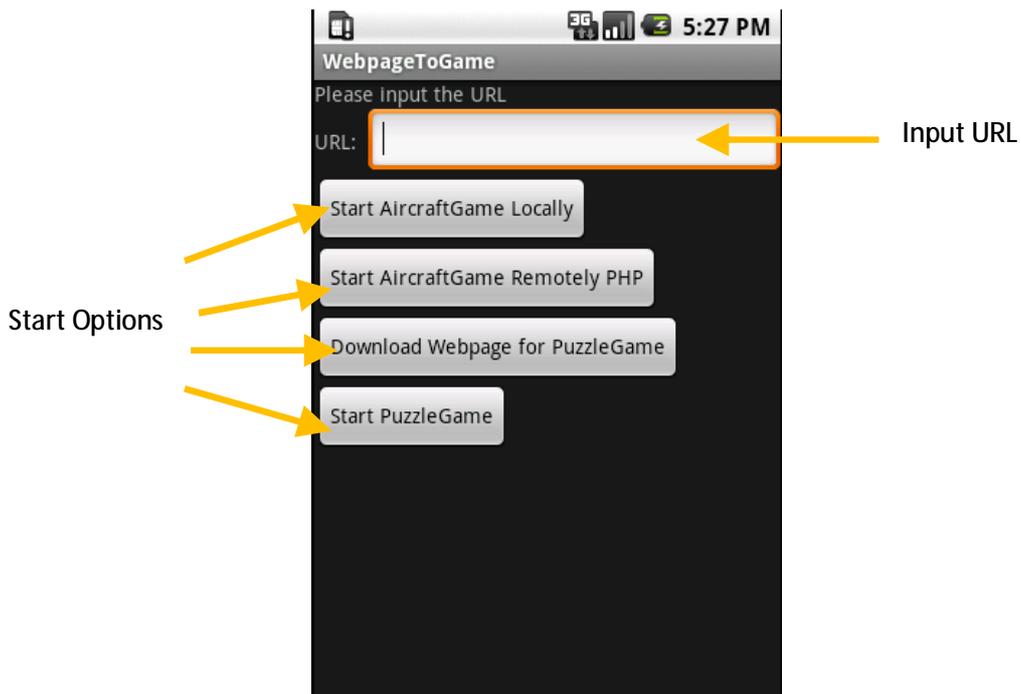
Figure 5.1 Main Activity

The effect of pressing first button and second button is same. The application will launch the fighter aircraft game.
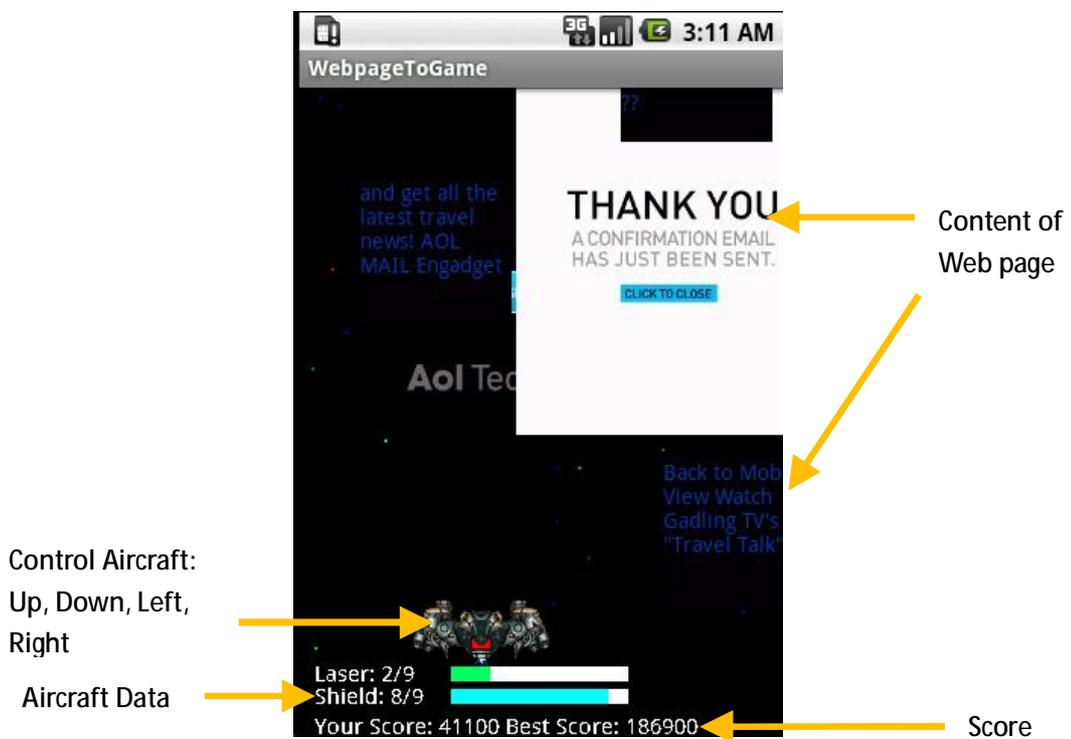

Figure 5.2 Fighter Aircraft Game Activity

The application will download the web page according to the URL. The original web page will be displayed.
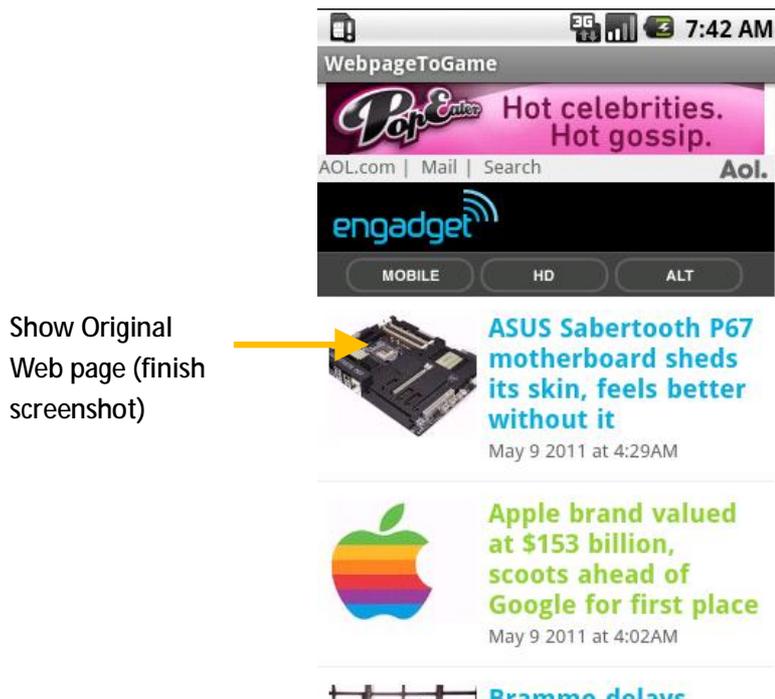
Show Original
Web page (finish
screenshot)

Figure 5.3 Puzzle Game Download Activity

Then the user can return to main page and press the fourth button to start puzzle game.
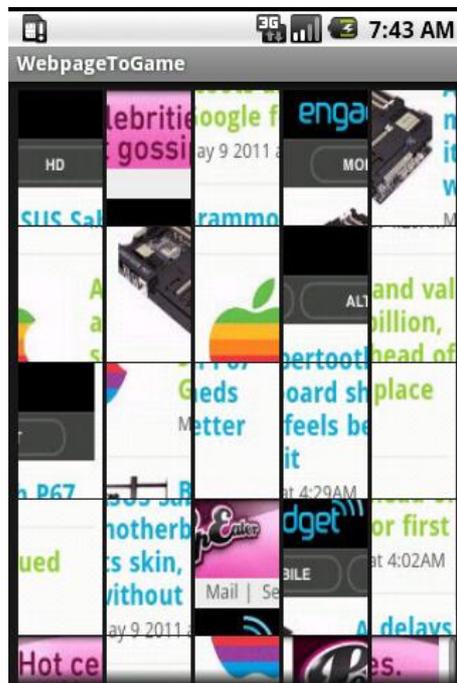

Figure 5.4 Puzzle Game Activity

Figure 5.5 Grid Movement in Puzzle Game

6. Constraints

(1) The step of URL input cannot be skipped. The error would happen if the user press buttons without inputting URL.

(2) The fighter aircraft game performs not so well when processing the web page that has too much content. The user has to wait for relatively long time after inputting the URL and press the button. And some content may miss in this case.

(3) If the user wants to restart the fighter aircraft game, instead of going back to previous page, he needs to restart the application.

(4) The puzzle game transforms part of the web page, rather than the whole web page, into the game. And the area cannot be selected by the user.

7. Further development

Since limited time, the basic structure of the game is done and there are many possibilities for further development and improvement, such as:

(1) The interface of the application can be improved to make it become more friendly

(2) The algorithms that are more efficient can be used in fighter aircraft game to shorten the time for recognizing images and words, and retrieving from memory.

(3) More algorithms can be implemented in puzzle game to make it more interesting

(4) The pictures in fighter aircraft game can be adjusted to make them fit for the game

(5) The puzzle game can allow the user select the area of web page he wants to convert to the game.

8. Conclusion

The successful deployment of an Android application with 2 games marks the creative goal of the project has been accomplished. With the aid of the open source project JSoup and fighter aircraft game, I managed to develop an application that transforms web page into the game. The users can absorb information by playing the games. During the progress of the development, I tackled some challenges, such as cutting the paragraphs in blocks, changing them into images, integrating resources of a web page into the games, reading and writing in mobile, etc. Although the games are simple and the effect is not attractive enough, with the successful deployment of the application, it means we have already implemented the idea and the project reflects an efficient method to achieve knowledge. What is more, the project has followed the trend of mobile business. It is built on Android, which could also be a powerful platform for spreading the core idea of the project.