New Canuck
ECE1778 Courser Project Final Report
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Content

1. Introduction

Canada is an immigrant country. U of T is also proud to be the home away from home to almost 10,000 international students from over 150 countries. As one of the many new International students in Canada, we known how much this community need to know about Canadian culture and custom.

Thus, we create an app to help the future immigrants to adjust to the new customs and culture in Canada, and encourage them to check out the interesting places and have new experience, education themselves about this beautiful, diversified and friendly country conveniently and immediately.

Our app has two attractive scenarios. The first one is called tour mission model. The goal of this feature is encouraging players to try different interesting experiences in Canada with recommendations from native Canadians. When they complete the mission, they would be asked to take a picture to record and prove their achievement. Our app can verify whether the player completes the mission by matching the location of the player with the place which provides by the publisher of the challenge. Furthermore, players can rate and comment the missions after they complete it.

The second scenario is quiz game. Under this scenario, the players are required to answer fix number of questions. These questions are related to a various types of knowledge like Canadian slangs, food, history, culture, etc. At the end of every quiz, our app can analyze the player's answers, and generate a report. The report can give some customized advices and information to help players to enhance their knowledge that player is weak at.

We integrate crowd sourcing to both features. The basic idea of crowd sourcing is that expert players like native Canadian or related organizations can create missions or quiz questions and new comers can download them to play. In order to guarantee the high quality of the missions and quiz questions open to common users, we build a web-based management platform for administrators to maintain the database. People who are sincere to help new immigrants will be selected as administrators. The responsibility of them is to decide whether a new user submission like mission or quiz question should be approved or rejected. Only the submissions with approval can be downloaded by common users.

Our app can also record player's history of using the app. We hope our application can encourage and memorize players to grow from new immigrants to new Canucks.
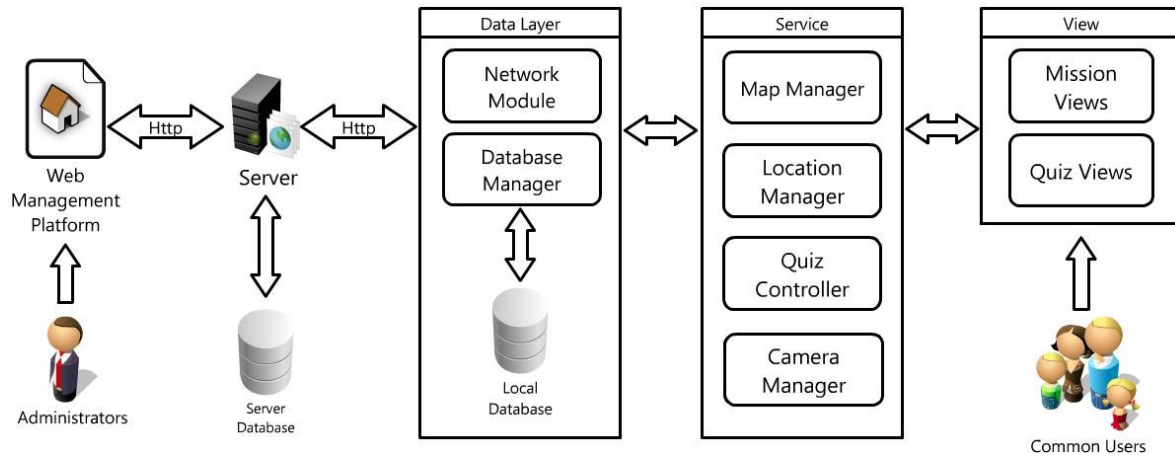
2. Overall Design

Figure 1: *Block diagram for the overall design.*

The architecture of our app has three main parts, namely the Android smart phone client, the server, and the web management platform.

The core part of the structure is the server which provides data with both the management platform and the Android client. We use Apache Tomcat to support the functionality of network communication. In addiction, we use Struts2.0 not only because it is efficient to program, but also for its high performance in concurrent processing. Data like user information, quiz questions and missions, are stored in a MySQL database connected to the server. Now the server has been deployed with Amazon cloud service.

The web management platform is open to administrators to maintain the data in the server database. It is a standard java web application built with JSP, HTML and CSS.

In terms of the Android client, it has three layers. The responsibility of the lowest layer which is the data layer provides data to the higher layer and controls the communication between the client and the server. A local database is built for the purpose of supporting offline usability in the case of when users can not connect to internet and, therefore, they can use the app with the missions and quiz questions updated previously. The second layer is the service layer which contains the code of different tools applied in the app, such as a map manager to operate Google map, a location manager to manipulate the GPS system in a phone, a quiz controller and a camera manager used when the app needs to take a nice picture. The highest layer is the view layer which controls the UI to interact with the common users.

3. Functionality

All functionality proposed for New Canuck worked in the final product; please see below for screen shots and description.

3.1 Android Client

In the Android Client, ther are two main models, mission tour and quiz game.
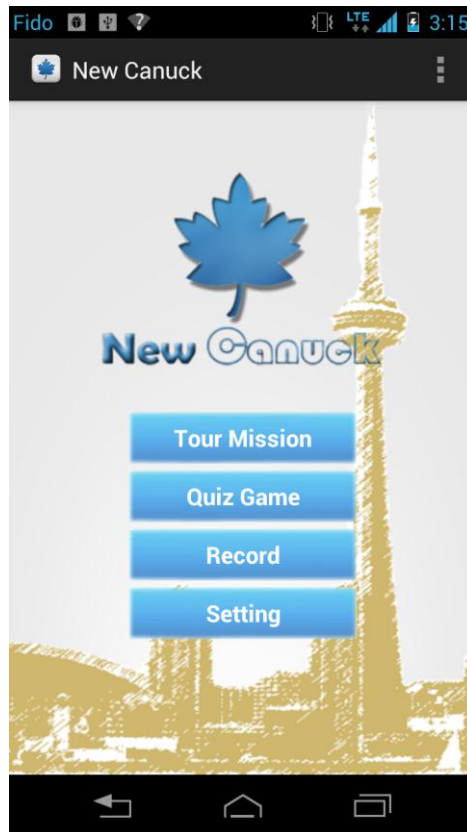
3.1.1 Home Page

Figure 2: *Home page.*

Our home page can directly navigate user to four sessions: tour mission, quiz game, record and setting. In tour mission part, we can take and complete selective interesting missions shared by other players as well as create new missions to share. In quiz game part, you can choose prefer types of questions and test yourself. In the record section, you can have a look at your score and see your growth path. In the setting part you can set our user name so others can see your name after you share your feelings.

3.1.2 View Tour Missions
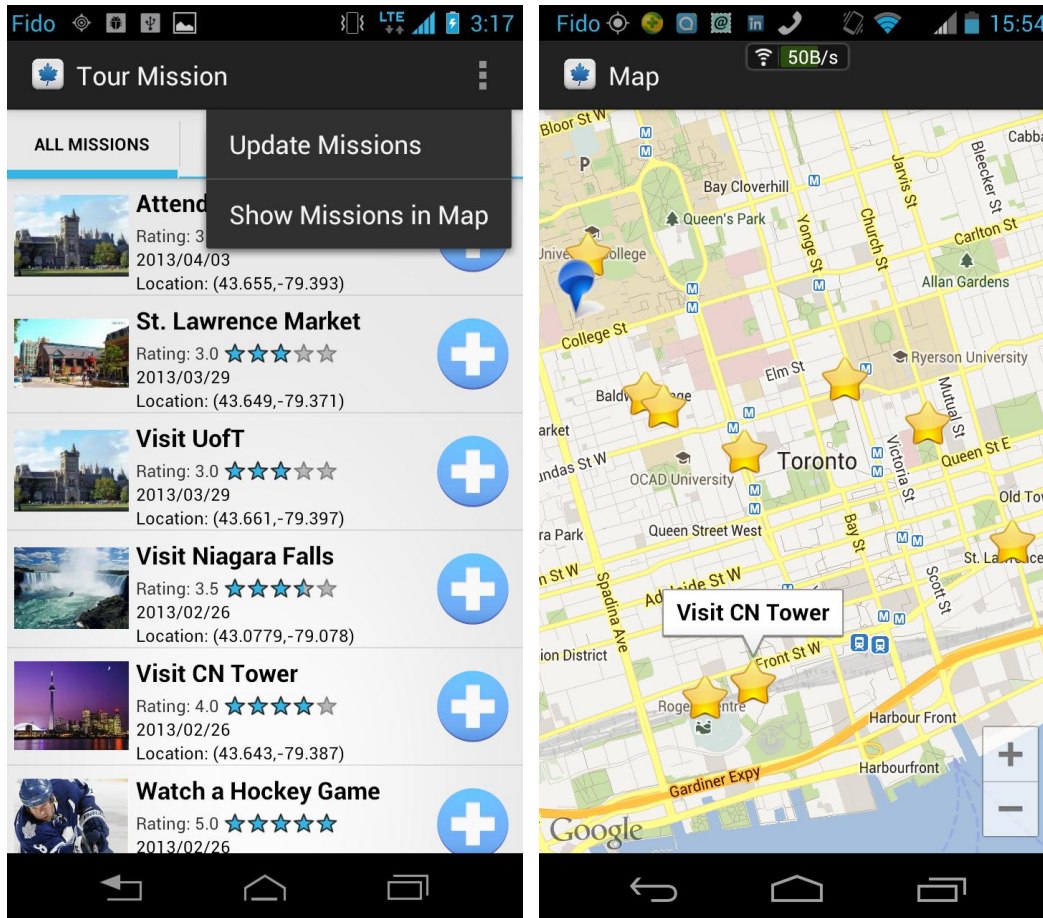
(a) *List view to show all the missions.*   (b) *Map view to show all tour missions.*

Figure 3: *Tour mission.*

In the list view, player can easily update and scan all the missions, while in the map view, player can choose their prefer missions by location.

3.1.3 Take a Mission and Complete a Mission
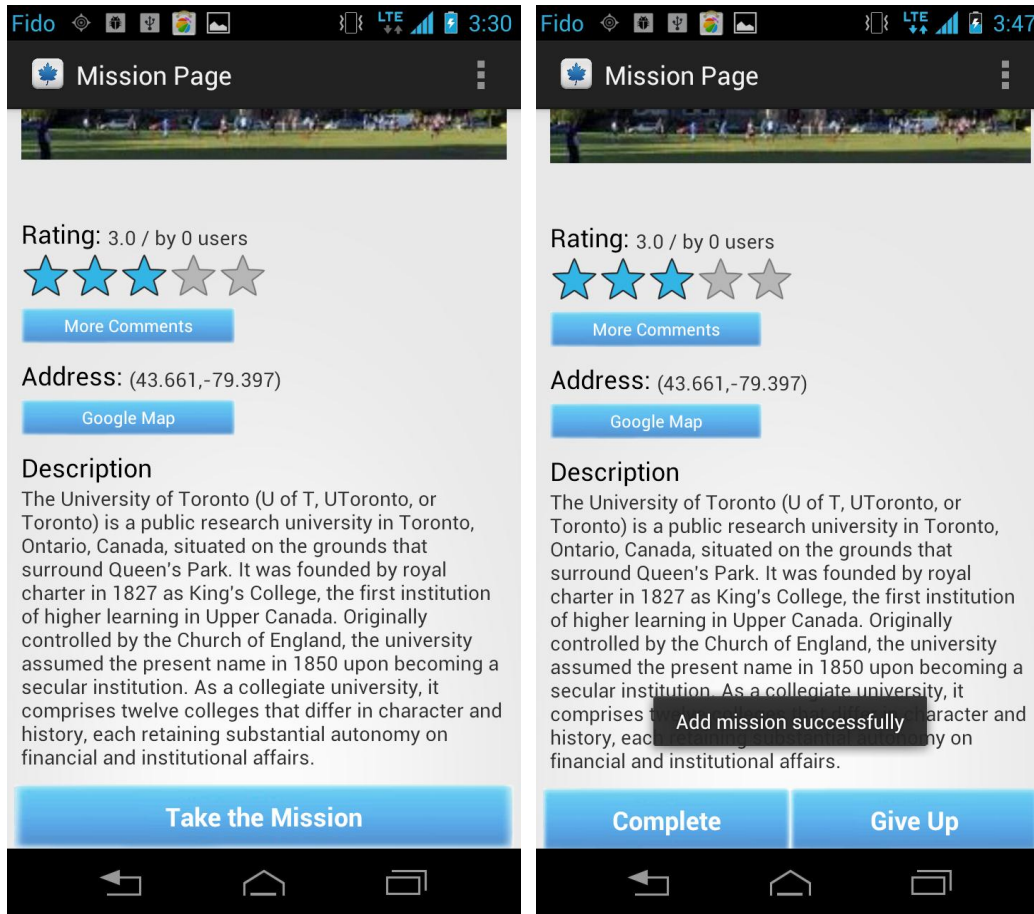
(a) *View to take a mission.*   **(b)** *View to complete a mission.*

Figure 4: *View to take and complete a mission.*

Before taking a mission, users can read the description and rate of missions. When a player clicks the complete button, the app can check the user's location to verify the completion.

(a) *View to upload feeling.*   **(b)** *View to share feeling.*
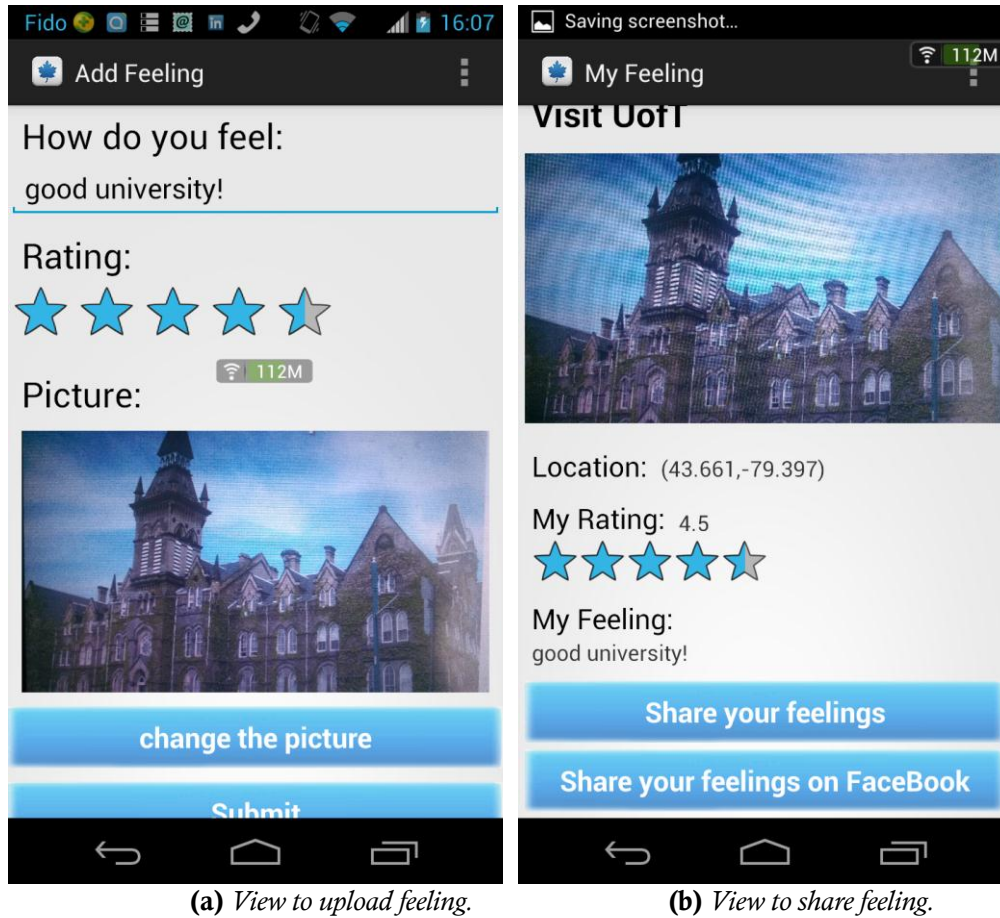
Figure 5: *View to input and share feeling.*

After finishing a mission, player can rate the mission, add feelings and take a picture as proof. Player can also share picture and feelings by clicking the share button.

3.1.4 Create New Mission
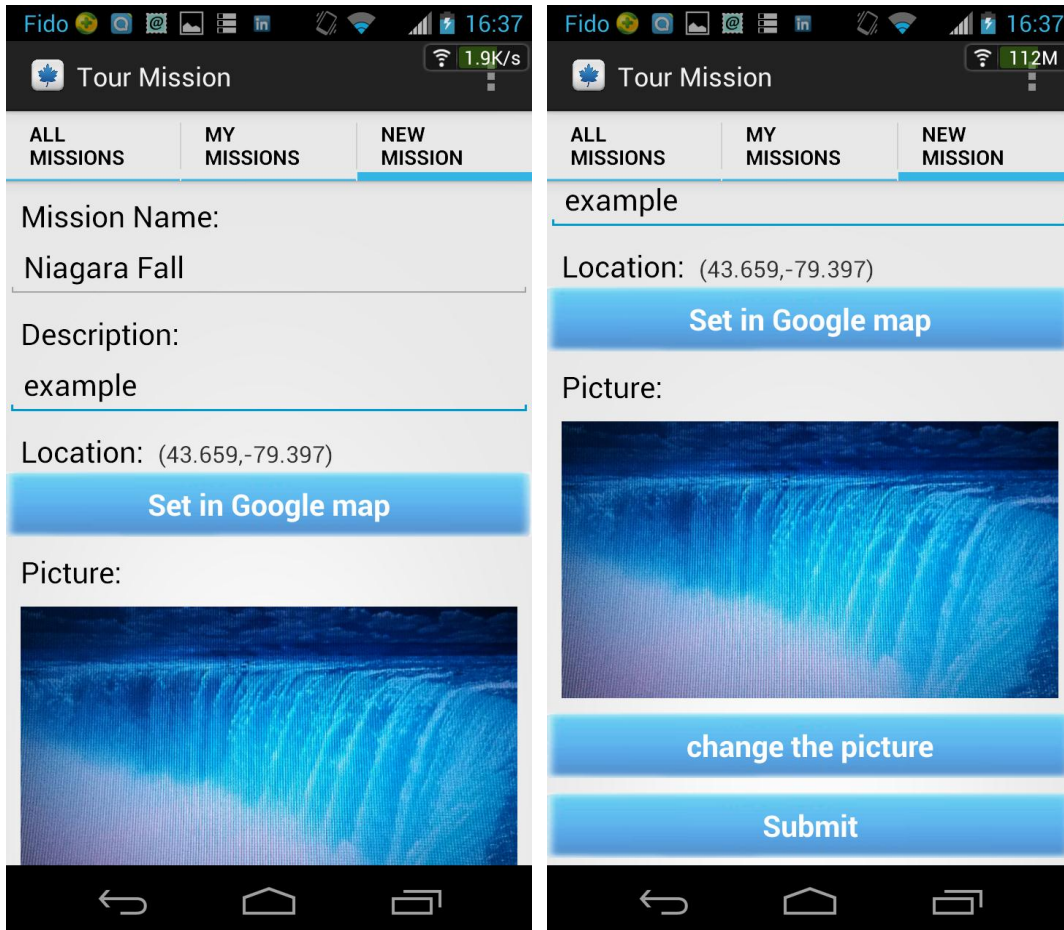
Figure 6: *View to create a mission.*

Except for taking missions, player can also create new missions by writing mission name and description, and set mission location and cover. After a newly-created mission is approved by the administrator on the website that will be introduced in chapter 3.2, all the users can see this mission after update the mission pool.
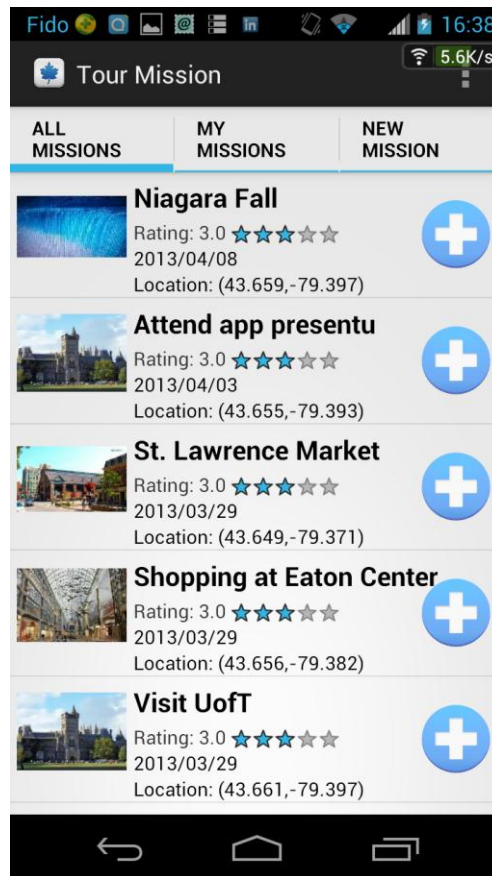
Figure 7: *Mission list view with the last created mission after update.*

3.1.5 Play Quiz Game

Another part of our app is quiz game. In this part players can choose their favorite types of questions and do the test. The page views to choose questions and play quiz game are showed as follow.
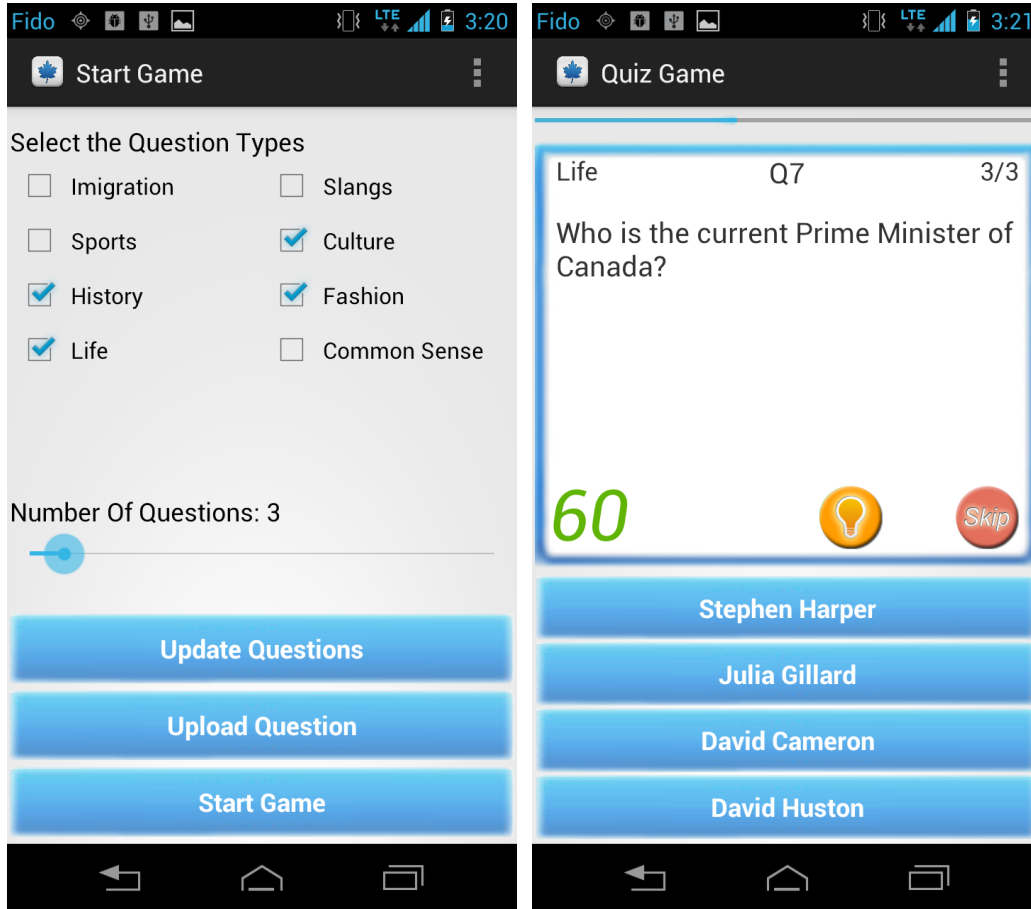
(a) *View page to choose type of quiz question.*   **(b)** *View page to play quiz game.*
Figure 8: *Quiz game view page.*

In the Figure 8 (b), we can see the props that help users to finish the quiz game, like hint, skip and deleting 2 wrong answers.
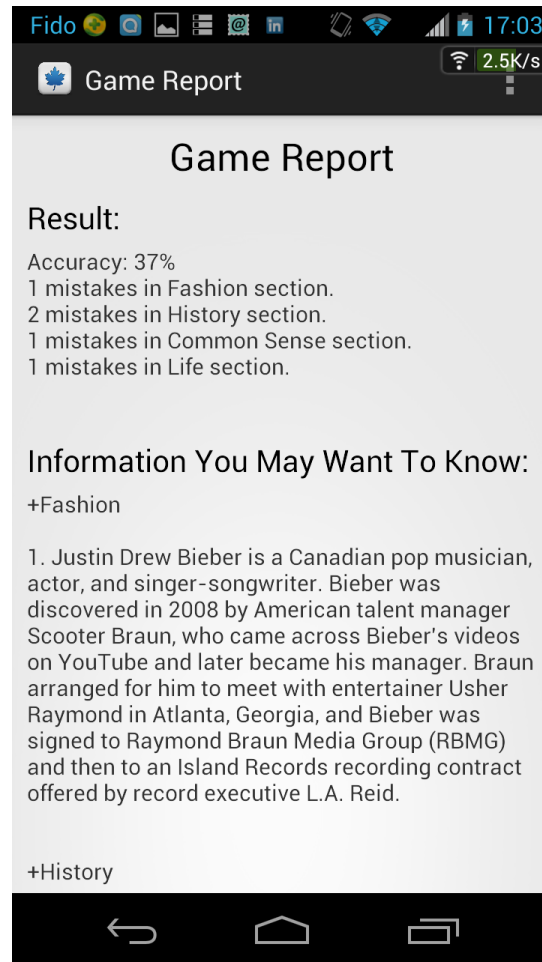
Figure 9: *Report view page to show quiz accuracy and suggestions.*

After finishing the quiz game, users can see the report of the quiz; it shows the accuracy and suggestions about the quiz.

3.1.6 Create new Quiz Question
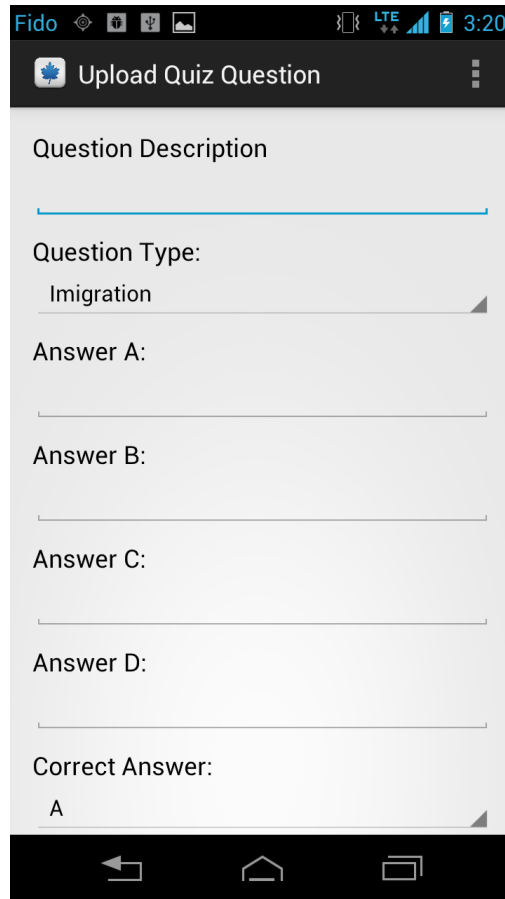
Figure 10: *View page to upload new quiz questions to server.*

The Quiz game is also crowd-sourcing, and in the view above users can create new questions and upload them to the server. After the administrator approves the question, newly-created question can be seen by other users.

3.1.7 User History
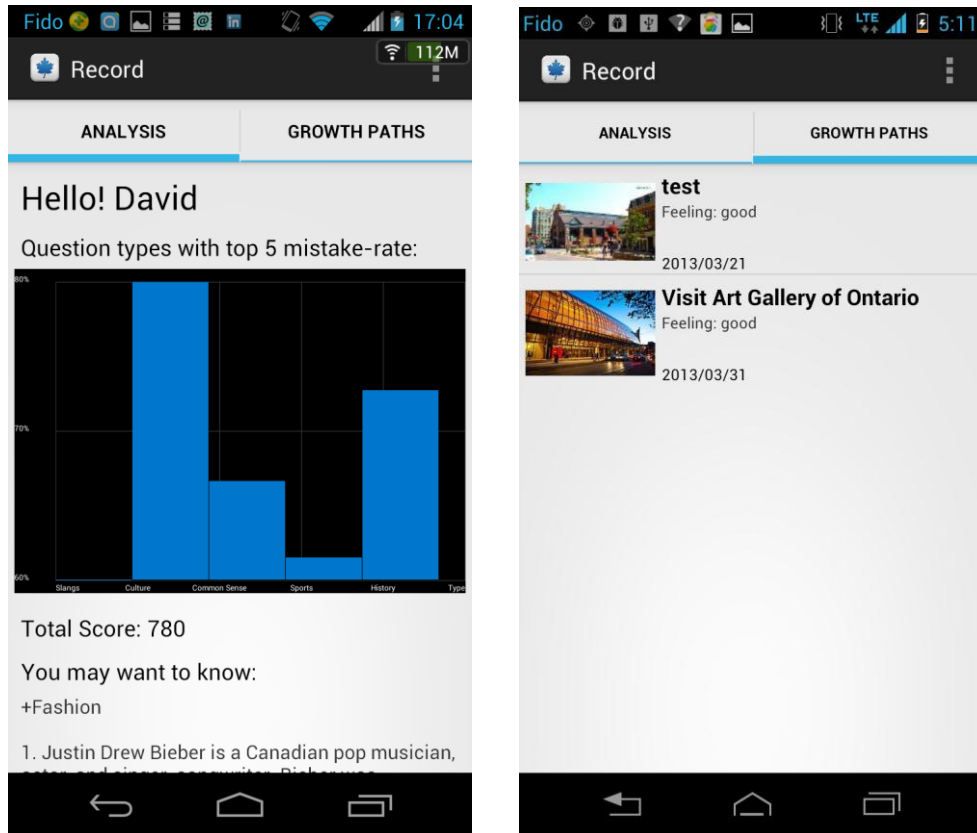
(a) *View page to show the quiz game analysis.*   **(b)** *View page to show the growth paths.*
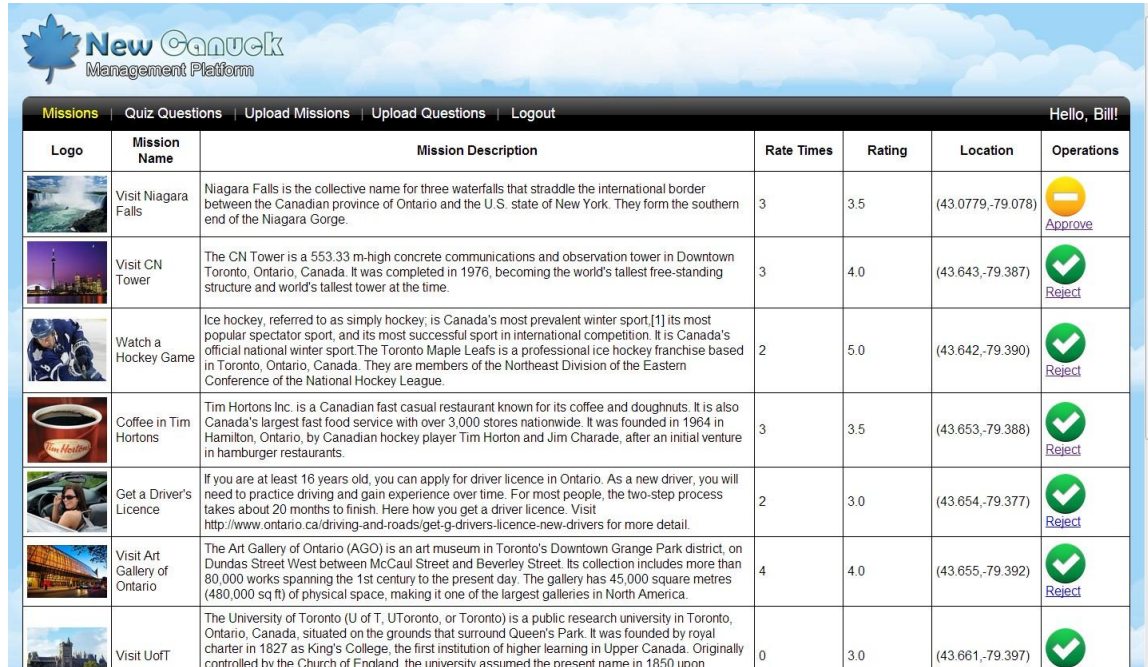
Figure 11: *Record view page.*

In the record part, users can choose to see the analysis for their quiz game and the growth path which shows all the feelings that players have added before. From the bar graph, users can easily tell which kinds of knowledge need to be strengthened.

3.2 Web Management Platform

In order to guarantee the quality of missions and questions, we create a manager website.

3.2.1 Manage Missions

Figure 12: *Website to manage mission pool.*

In order to avoid the garbage missions and questions, we create a web application to manage the mission pool and the quiz questions pool. All the newly-created missions and questions must be approved by the administrator before they reach users on this web page and the webpage below.

3.2.2 Manage Quiz Questions

Figure 13: *Website to manage quiz game questions.*

4. Key learning

From this project the team members summarized three points of key learning as below.

The most important point is that we should coordinate well with the Apper at the beginning of the project. Our Apper experienced some challenges when the project began and she dropped the course unfortunately. Her departure left us several problems such as theoretical support to the app. We concluded that as two programmers, we should coordinate well with the Apper more and gave her enough support when she have difficulties.

Secondly, we did not do enough preparation at the beginning of the project and start coding so soon. We should spend more time in understanding the true need of immigrants before building the app.

Finally, both of us are little frustrated with the feature of quiz game. The feature is still simple because of lack of time. Some other ideas like game theory and better UI could be drawn on to improve the feature if we have one more week.

5. Contribution by Group Members

Mengxi Liao (50%):
- ✓ Tout mission part of the mobile app
- ✓ Server support including the manager website and mobile client
- ✓ Documentation preparation

Zeyu Wang (50%):
- ✓ Quiz game part and record part of the mobile app
- ✓ Front site of the manager website
- ✓ Documentation preparation

6. Future Work

Firstly, we will perform the beta test by letting a few users to use the app for a period.

Secondly, after discussed with several immigrants, we realized another challenges for them is that new comers have to apply for a bunch of services, like SIN, PR, Driver's license or tax return in Canada. Therefore, we want to add the third feature called service guide in our app. This feature will provide users with step-by-step tutorials of applying for these services. Users can also leave their comments to every tutorial and point out the difficulties they experience in applying for these services.

Finally, we also want to build a portal website open to all users. Except for the features in the smart phone, the website also holds the responsibility of displaying announcements when the app has new updates and providing a forum for users to interact with each other.

Additional Note

1. If any organization is interested in our app for business purpose, the app is available. Please contact one of the two programmers in advance.

2. Source code can be Open Sourced anywhere and it is already open sourced on GitHub. Please Search for New-Canuck on the GitHub website.

3. Contact information:
   - ✓ Mengxi Liao: marcyliew@gmail.com
   - ✓ Zeyu Wang: wangzeyu0325@hotmail.com

Resources

1. Add Google Map to your app

We use Google map to let use be able to search nearby missions and set the location of a new-created mission.

Tutorial:
http://www.vogella.com/articles/AndroidGoogleMaps/article.html
Official Document:
https://developers.google.com/maps/documentation/android

2. Remote Server Support

Nowadays most apps need a server to support. We use tomcat and struts2 to implement the server and use JSON to implement the communication between server and client. We also use MySQL server as the database to store the data in server. Finally the server is deployed with EC2 Server supplied by Amazon.

Apache Tomcat Tutorial:
http://tomcat.apache.org/
Struts2 API Document:
http://struts.apache.org/development/2.x/
Struts2 with JSON:
http://www.mkyong.com/struts2/struts-2-and-json-example/
MySQL Tutorial:
http://www.mysqltutorial.org/
User JDBC to connect your database with Java:
http://docs.oracle.com/javase/tutorial/jdbc/basics
Deploy your server with Amazon EC2:
http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/Welcome.html

3. Build Your Website with Struts2 and JSP

Once you have a server running, it easy to build a website based on the Struts2 and JSP and polish your website with CSS.

Struts2 Simple Login Tutorial:
http://www.devmanuals.com/tutorials/java/struts/struts2/Struts2SimpleLogin.html

4. Lazy load images to List View and Content Cache

When your list View has many images loaded from Internet, for both performance and offline usability, it is important to load your images asynchronously and use both memory and storage to cache the images.

Tutorial:
http://vsvydenko.blogspot.ca/2011/06/asynchronous-lazy-loading-and-caching.html

5. Android Graph View

A good lib to add statistic graph in your app. Styles include bar charts and line charts.

Tutorial:
http://www.jjoe64.com/p/graphview-library.html