Stevens Student Project Report

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1. Introduction

Smartphones have noticeably taken over in recent years with popularity rising in college campuses. They are portable, convenient and nearly as useful as a laptop. However, due to the screen size and less powerful browser of smartphones, it is difficult and troublesome for students to get access to school resources from school full website. Therefore, it is important to create mobile websites or a native app of the school for smartphones.

Stevens Institute of Technology(Stevens) has already made native apps for iOS and Android, and a mobile website for stevensducks. However, these native apps do not perform well enough. For instance, the “read more” button in the News Section is not working, and the information in the Events Section is not well formatted. What is more, the apps lack some useful functions such as shuttles and dining menus of school dining halls. With regard to mobile websites, Stevens only have one mobile website, which is not enough for students. Therefore, we decide to create another native app for mobile device and mobile websites of Stevens.

2. Problem Definition

2.1 Android

Create a native app of Stevens for android platform. The native app should include several useful functions for student and highly distinguishable with Stevens official android app.

2.2 Web App

Create a web app version of Stevens Websites. The web app should include several important functions of the Stevens full website and behave like a native app.

3. Outline Solution

According to the survey of Stevens students and current resources that Stevens provide on the website, the new Android application, which called “Stevens Students”, should have the following 10 functions: News, Events, Athletics, Shuttles, Dining, Directory, Course, Emergency, Building, Links.

News and Events are presented in the web app part in order to achieve the best appearance. Athletics function already has mobile website, so we only need to give a reference link to it in our android app and web app. The other seven functions are achieved in the android part. We also build a server to fetch data from Stevens websites to obtain dining, news and events information.

The outline of our solution is:

(1) Web app: News, Events, Athletics(Reference).

(2) Android app: News & Events(Reference of Web App), Athletics(Reference), Shuttles, Dining, Directory, Course, Emergency, Building, Links.

(3) Server: Fetch dining, news and events information from Stevens.

4. Detailed Design

4.1 Android

4.1.1 Environment

(1) Android Development Tools (ADT)
(2) iMovie
(3) Target SDK: 8 - 19
(4) Test Machine: Nexus 5

4.1.2 ListViewAnimations Library (LVA)

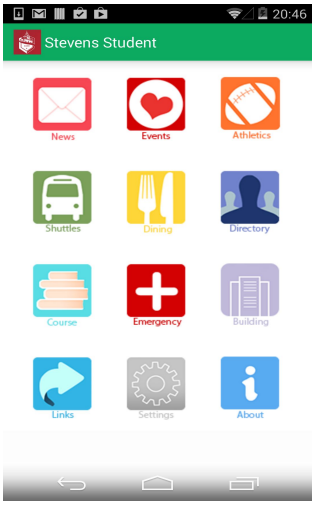
(1) The library can be download from the following link:
https://github.com/nhaarman/ListViewAnimations

(2) Setup the library:
[1] In Eclipse, just import the library as an Android library project.
[2] Project > Clean to generate the binaries you need, like R.java, etc.
[3] Add ListViewAnimations as a dependency to your existing project

(3) The library is implemented to provide Google Card like User Interface. The card is highly customizable.

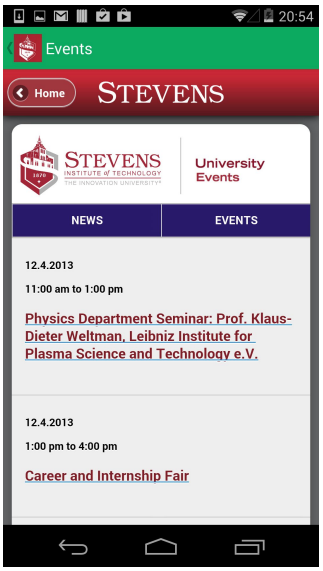
4.1.3 DashBoard

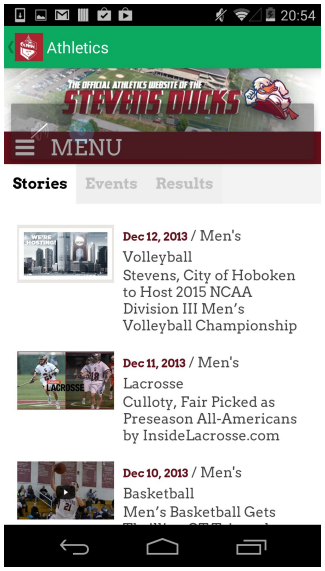
DashBoard uses GridView of 12 icons. Thanks to the LVA, the icons have an buttom-to-top animation.



4.1.4 News & Events & Athletics

These functions use WebView class to display mobile web page.





4.1.5 Shuttles

Shuttles data is obtained from the site: http://www.stevens.edu/sit/sites/default/files/stevens-shuttle.pdf

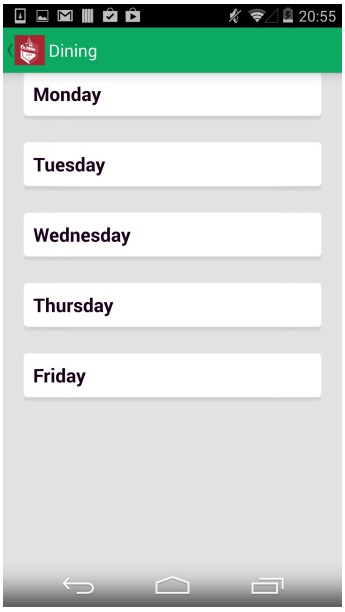
In the Shuttles Class, according to the current time, the arrival time of next Stevens Shuttle arriving after the current time will be displayed.

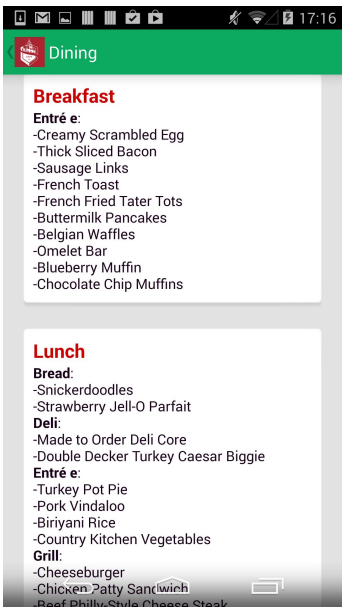
4.1.6 Dining

Dining data is obtained from the site by server: http://stevensdiningservices.com/

In the Dining class, the user can choose from Monday to Friday. Suppose he clicks on "Monday" button. The program will fetch the data from the server using HttpService and filter the data to get the Monday's dining menu.

In order to make the dining menu card neat, Html.fromHtml() is introduced to use html code to format data.





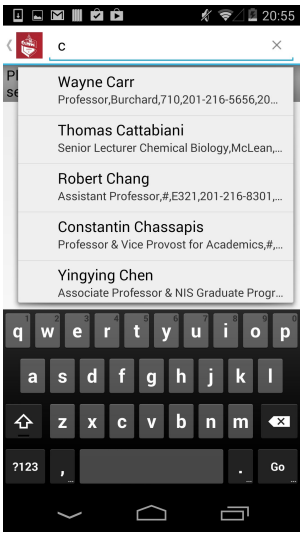
4.1.7 Directory

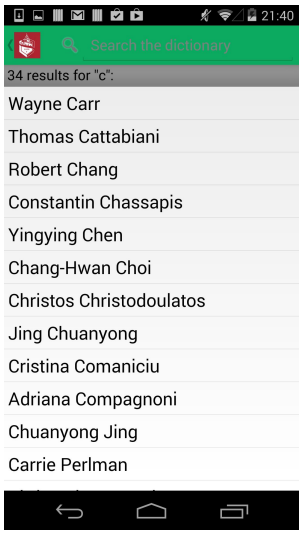
(1) Data Structure

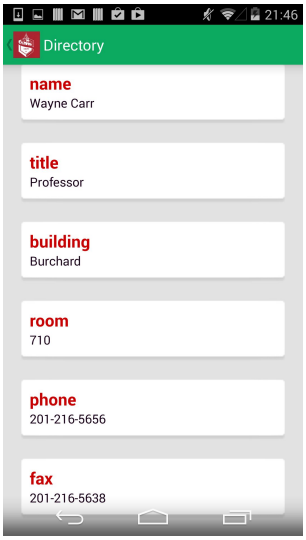
The Data is stored in the "res/raw/directory.txt". When the user click on the search icon, the ContentProvider will fetch the data from database(DB) class to show the search suggestion and search results. The DB will check if the database table exists. If not, DB will fetch the data from txt file.

(2) Phone & Email

If the user clicks on a professor(result), it will show the detailed information about the professor. Then the user can click on the professor's phone number to call professor or the professor's email to write email to the professor.







4.1.8 Course

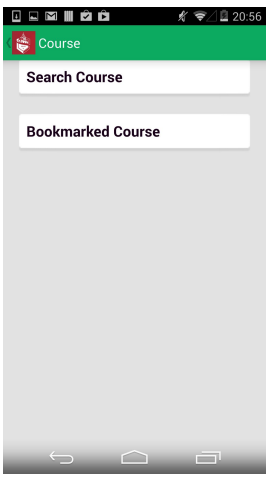
(1) Search course

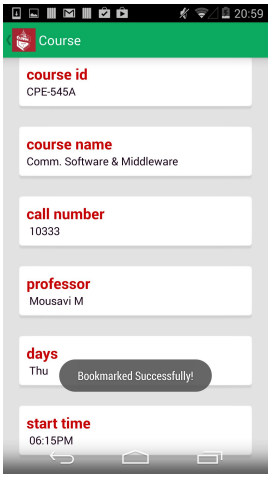
Course function uses the same ContentProvider - DB - txt data structure as directory.

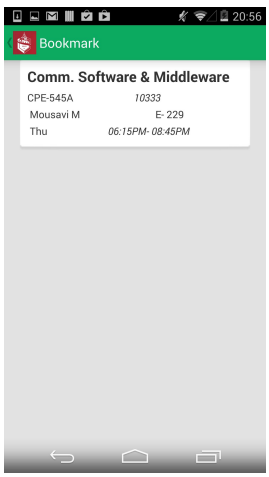
(2) Bookmark

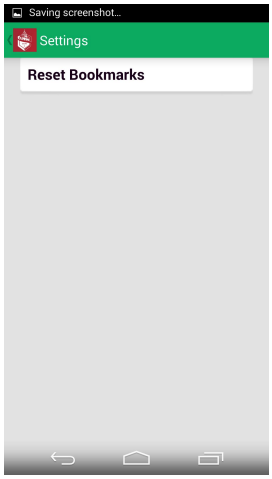
Users can click on the name of course to bookmark it. The bookmark page will show all the course bookmarks, which will be presented as nice cards containing basic information of the course. Bookmark is stored in the SharedPreference.

There are three ways to delete bookmarks. Firstly, find the bookmarked course and click on its name. Secondly, right-swipe the bookmark on the bookmark page. Lastly, click on the reset button in the Settings to delete all bookmarks.









4.1.9 Emergency

The emergency message from the server will be displayed in the white area with the help of HttpService. The bottom area will show the contact information of campus police.

4.1.10 Building

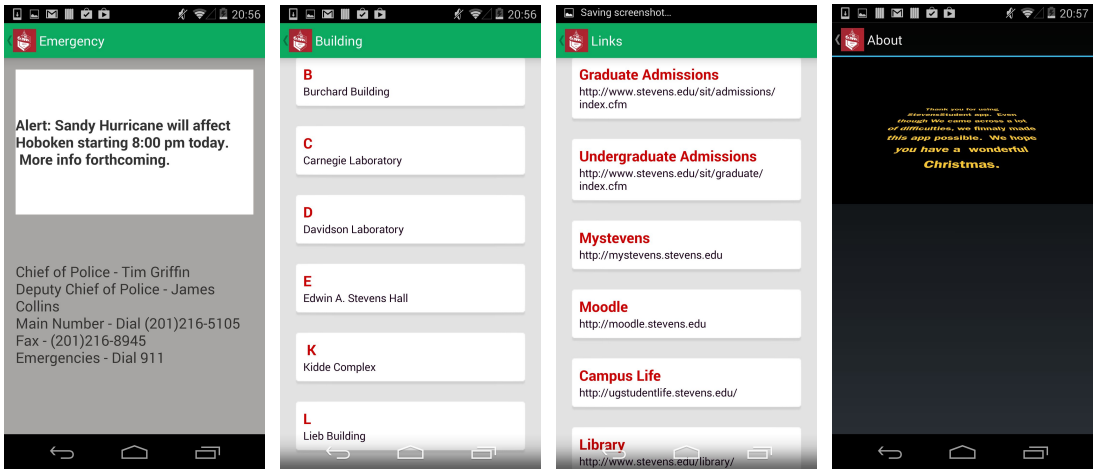
Users can check the building codes in this function.

4.1.11 Links

List of useful links related to Stevens. Users can click on the link to visit the website with the help of WebView.

4.1.12 About

This part will show a movie of closing credits. The movie is produced by iMovie.



4.2 Web App

4.2.1 Environment

a) When built the web app, we refer to Stevens CSS style sheets and JSP, so as to make the page style just like the Stevens web page (see Fig.1).
Other reference:
- jquery mobile
- w3cschool(html/css/jsp)
- jquery online manual

b) Building tools:
- Adobe Dreamweaver
- Ultimate CSS Gradient Generator
- Notepad++
- Xcode(iSO SDK)
- Chrome browser

4.2.2 Functions

For this web app, we have implemented two main functions and several handy little features. All web pages are set into three levels. The page levels show as follows:

Fig 1 page level

4.2.2.1 News and Events

The two main functions are News and Events modules.

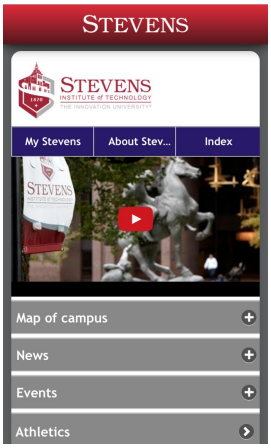


Fig.1

Fig.2

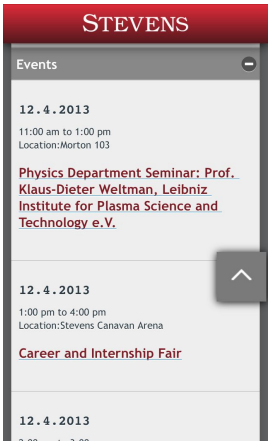


Fig.3

By touching the gray bar “News” or “Events”(see Fig.2 and Fig.3), the News or Events list that in chronological order will unfold, and view full text by touch any news or events(Fig.5).

Fig.4

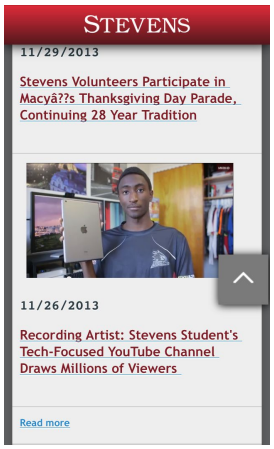


Fig.5

When touch “read more”(Fig.5), the page go to “News” and “Events” page.
And the second level pages can be switch by the blue bar.

4.2.2.2 Other features

(1) Go to top button:

This button is implemented by use goToTop.jsp. This square button will appear when the page slides down, and disappear when the page back to top.

(2) Quick link bar:

This bar is implemented by use superfish plugins. The icons on the bar will change color when touch on it

(3) YouTube video:

On the top of Index page, there is a video of introduction of Stevens. This feature is implemented by using YouTube API.

Fig.6

Fig.7

4.3 Server

Receiving the requests including News-request, Events-request, Dining-request, and then, response the request by sending the table relevant. Getting data from database and adding data to database . Searching and getting data from Stevens.edu.

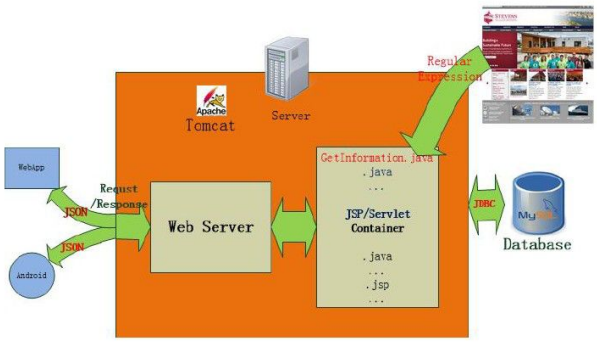
4.3.1 Environment

(1) Java EE Eclipse

(2) MySQL/MySQL workbench

(3)Tomcat

All the environment and methods used in server can be shown in the picture below:



4.3.2 Collect Data

Server will visit stevens.com to get the data we need in this application. And Regular Expression will be used to get the information needed. For the exact information needed, server will visit the website below:

Campus News

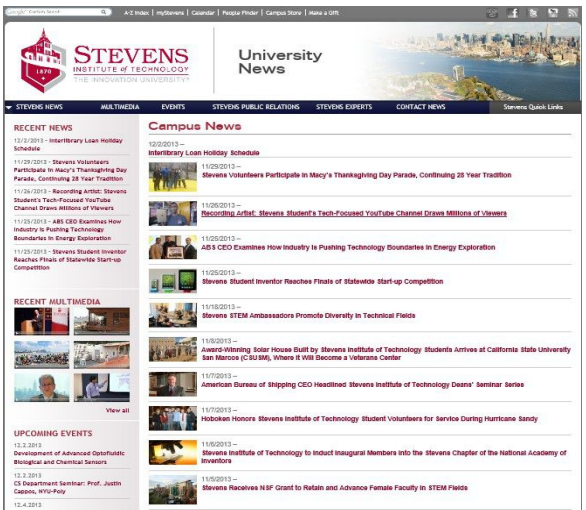
http://www.stevens.edu/news/articles/Campus-News

Stevens Events

http://www.stevens.edu/news/events

Stevens Dinning

http://stevensdiningservices.com/



(1) News

In this page, News title, date, ip address will be caught by using regular expression like

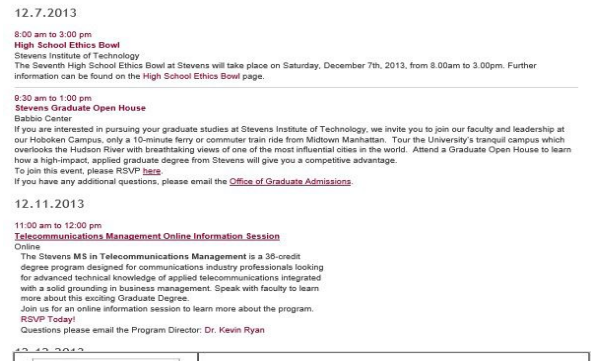
"((http|https):(\/\/www\.\w{1,}\.(edu|com|cn|net|org))(\/((\w){1,})){1,}(\.(jpg|gif|png|bmp)))" .

And then, sever will visit the exact one piece of news with the ip address to catch the news content and image link.

And at last, all the information will be packaged as one object stored in database.

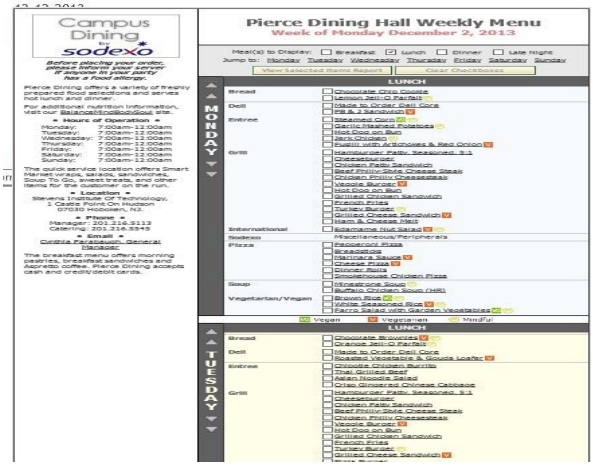
(2) Events

Events Title, date, hours and location will be caught in the events list page. And then visit one of the exact event to get the content inside. At last, it will be package with specific id as one object stored in database.



(3)Dinning

Because every kind of food belongs to specific food type, meal name and week date, even some of them are the same food name, they should be stored as different rows in the data base. Reversely, before collect the food name, week date should be found first as upper index, and then meal name and food type.



(4) Because all the data will be updated every date, in order to collect the data easily, a page "updateDB.jsp" is created with a button "Update Database" . When it is pressed, the function to collect and store data will be called.

news_id	news_title	news_address	news_content	news_img_link	news_date
1	Stevens Volunte...	http://www.stevens....	<p><span style="line...	http://www.stevens...	11/29/2013
2	Recording Artist:...	http://www.stevens....	<p><span style="line...	http://www.stevens...	11/26/2013

events_id	events_title	events_address	events_content	events_hour	events_location	events_date
1	Development of Advance...	http://www.stevens....	<p><img alt="...	2:00 pm to 3:00 pm	Kidde 360, Stevens Insti...	12.2.2013
2	CS Department Seminar: ...	http://www.stevens....	<p>Title: NetC...	2:00 pm to 3:00 pm	Babbio Center 221	12.2.2013

item_id	week_date	dinning_type	food_type	food_name
1	MONDAY	Breakfast	Entree	Creamy Scrambled Egg
2	MONDAY	Breakfast	Entree	Thick Sliced Bacon
3	MONDAY	Breakfast	Entree	Sausage Links
4	MONDAY	Breakfast	Entree	French Toast
5	MONDAY	Breakfast	Entree	French Fried Tater Tots
6	MONDAY	Breakfast	Entree	Buttermilk Pancakes
7	MONDAY	Breakfast	Entree	Belgian Waffles
8	MONDAY	Breakfast	Entree	Omelet Bar
9	MONDAY	Breakfast	Entree	Blueberry Muffin
10	MONDAY	Breakfast	Entree	Chocolate Chip Muffins
11	MONDAY	Lunch	Bread	Double Chocolate Chip Cookie
12	MONDAY	Lunch	Bread	Strawberry Jell-O Parfait
13	MONDAY	Lunch	Deli	Made to Order Deli Core
14	MONDAY	Lunch	Entree	Greek Chicken Wrap (1)
15	MONDAY	Lunch	Entree	Pork, Corn & Green Chile Stew

4.3.3 Send data to clients

By using DAO(Data Access Objects) model, data in the database can be easily used on the web pages.

5. Testing & Validation

5.1 Android

5.1.1 Solved Problems

(1) Install Library Problem

If the library project requires android-support-v7-appcompat.jar, the jar file must be put in the libs folder before it is added in the “build path - Libraries”.

(2) Shuttles Activity Problem

The shuttles activity consists of two parts: Description Part and ListView Part. Because We can only use ListView in one class, We have to use two fragments in order to function well.

(3) Card Undo Problem

Due to the limitation of the LVA library, only the ListView consist of cards with only one TextView can use undo function. If the cards’ UI is more complex, the cards will be corrupted after undoing the swipe.

Therefore, undo function is not included in the swipe process during this project.

(4) Text File Fetch Problem

At first, only ContentProvider is used to fetch text file. However, the text file cannot be properly fetched when the user trigger the search process. Therefore, DB class is introduced to be the bridge between ContentProvider and text file.

(5) SharedPreference Problem

In order to manage the bookmarks better, all bookmarks are stored in a single variable(a). Another variable(b) is created to store the number of bookmarks. However, because a and b may be null (no bookmarks created before), the program needs to take care of this situation.

(6) Dining Problem

In order to format the dining data in a proper way, html code(`<br />, <b>`)is added and we use Html.fromHtml() to format the data.

5.1.2 Unsolved Problem

(1) HttpService Problem

Because currently HttpService class can only fetch data from Strings, we have to let the server output the data to a site and use the site url to fetch data. However, the data is not secured.

(2) LVA Library

Because the ListView based on LVA library cannot add buttons, we have to use actionlistener to simulate the button process. However, the user may not realize that the card can be pressed. For instance, he may not realize that he can press the telephone card to call Professor.

5.2 Web App

5.2.1 Solved Problems

(1) The style of interface (Global Color Scheme, the rounded rectangles)

We referred to Stevens CSS style sheet and found some useful class and id, by import these we successful built our wen app.

(2) The wrap problems

When use the dates from server, we encounter a line wrap problem. The word in the text cannot wrap with changing width of pages. We successful solved this problem by using some expressions like word wrap, word break and overflow.

5.2.2 Unsolved Problems

(1) The overall arrangement of code is kind of mess.

(2) The overall implementation is kind of complex.

5.3 Server

5.3.1 Solved Problems

(1) Collect data from the website

Because all the data on the website are updated nearly everyday, and they are in different format. It's hard to find a unify method to get the data like news, events and dinning together. So I designed several regular expressions to collect data.

After visiting news list page, I designed a regular expression to catch all the news of the list on this page. And then ,by using a loop to visit all the news and store them in the data base separately.

(2) Show the data

When to show the data on the web page, we can't put too many code on the page. I try many ways to unify them. And finally, I employ DAO model to design my database model. By building DAO and Service layers, only one line of code is needed to show the data on the webpage.

(3) Images
Because images are too large to be stored in server, it is impossible to download all the images to the server. Hence, I just stored the image ip address in the data base, which means data on the server are based on stevens server.

5.3.2 Unsolved Problems

(1) When collect content of news and events, there are many irregular characters in the content. So they will be garbage characters in the database. I haven't solve this problem.

(2) In order to transmit data to the Android client, I didn't use json format. I just output the string on a blank page which will be visited by android client. It is not safe because all the client can get the information by visit this website.

6. Future Development

6.1 Android

(1) Android push Service will be implemented to make emergency function more useful.
(2) We will use Google Map API to make customized map of Stevens and put the map in the Map function.
(3) Share Button will be put in the android app to share information to most of the famous social networks.
(4) Prettier and easier-to-use card library will be implemented.

6.2 Web App

Map function, including google map and 3D map, will be implemented in the future.

6.3 Server

We will try to use json format to transmit data.

7. Conclusion

After five week learning and practicing, we finished this project integrally which give us a lot of accomplishment. Even though there are still some problems exist, our project meet our requirements in the proposal. So we all really learn a lot in this experience. Thank you and have a nice Christmas.