



**University  
of Windsor**

**Final Technical Report:**

**Lovely Pollen**

**Submitted by:**

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**Submitted to:**

**Dr. Pooya**

**Advanced Software Engineering**

## **1. Abstract (150-200 words summarizing your work and highlight your findings)**

For this project—— Lovely Pollen, this application is aimed at a group of people who are allergic to pollen.

Our work is to collect data from API and demonstrate the data to users, and this application is accomplished by the whole team. Haolun Wang and Fanting Shang took charge of designing the front pages and integrating the code behind and database with the front pages. Dongpeng Wang mainly took charge of the database and finding the pollen data API. Shouhong Zheng took charge of the data visualization and achieving GIS with a map in this application.

To begin with, the available pollen API is pretty hard to find. However, Dr. Pooya provided an available API to support our project, which is really helpful with his instruction.

All in all, our findings with support of Dr. Pooya, this application can not only show the weather in every region but also demonstrate the pollen data in every city.

## **2. Introduction (general overview, motivation, and importance of the problem, your contribution).**

Lovely Pollen is a pollen density prediction app that base on the Android platform. It can effectively show the data about pollen density , air quality index and real-time temperature in each region on the phone. Pollen allergy is a common disease, there are almost millions of Canadian who are affected by pollen allergy in each year. With the rapid development of urban construction, the urban afforestation is on a higher level, which results in more seriousness of pollen

allergy pollution. Especially in Canada, the rate of vegetational cover is high and there are millions of immigrants who come from various countries. If people have a serious allergy, they may breathe hard and cannot go to school or work. That is the reason we choose pollen detection as our app's direction. The majority of mobile phone users can get the real-time pollen data and weather forecast information at first time, in order to prevent in advance and convenient travel. In this paper, we make the following contributions:

We designed our own system that integrates pollen density data, air quality index and real-time temperature in each region, and it has a potential to help people reduce the incidence of pollen allergy.

The rest of the paper is organized as follows. In the next section, we introduce the tools and platform which we use for our project design. In section 4, methodology and system requirements analysis are discussed in detail, and the architecture of the whole project is presented. Experimental setup and testing will be presented in section 5. The testing will be showed in section 6. Section 7 is the finding and challenges we found during the process. We present conclude and a briefly future work at the end of the report.

### **3. Project Details and Methodology.**

#### **Definitions:**

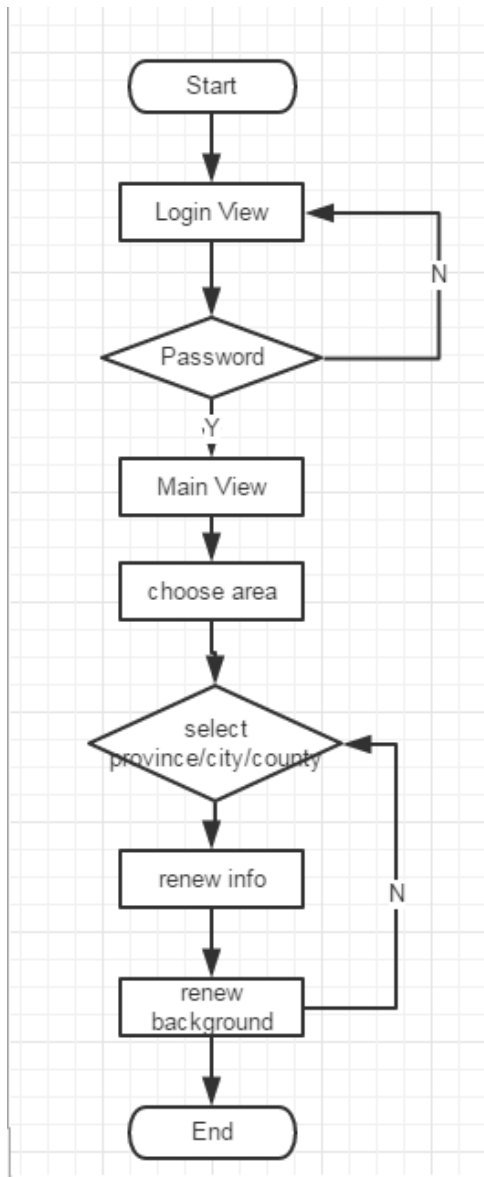
Due to “Lovely Pollen” is built on Android platform, the mobile platform is easy to carry and the application is easy to use, which is different from the web service. “Lovely Pollen” is built on Android Studio which integrates the developing environment with virtual device.

#### **Specification:**

For front page based on Android Studio, we built “xml” files in the “res” folder and matching java files in the “java” folder. The main method for building the front pages is with draw-able and layout, it is necessary to combine these two folders to show the main layout together. Moreover, the main activities include the list views and weather, pollen, tour tips activities. The login page is used by linear layout, and the list view page is used by linear layout and relative layout, and the main activity page includes all layouts (title, now, forecast, AQI (Air Quality Index), suggestion).

For code-behind technology, the application use the information from the Internet transfer into Json/gson format and use these analysis data into program.

## **Architecture**

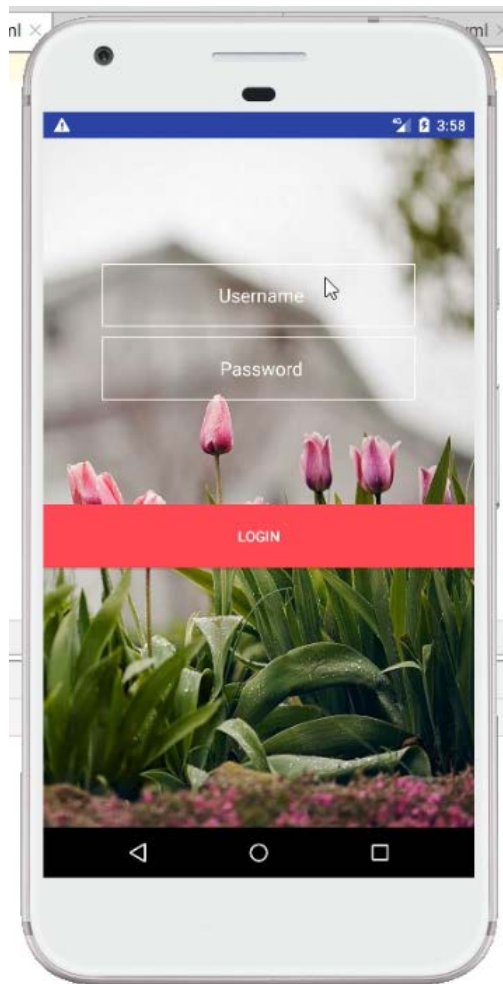


## Platform

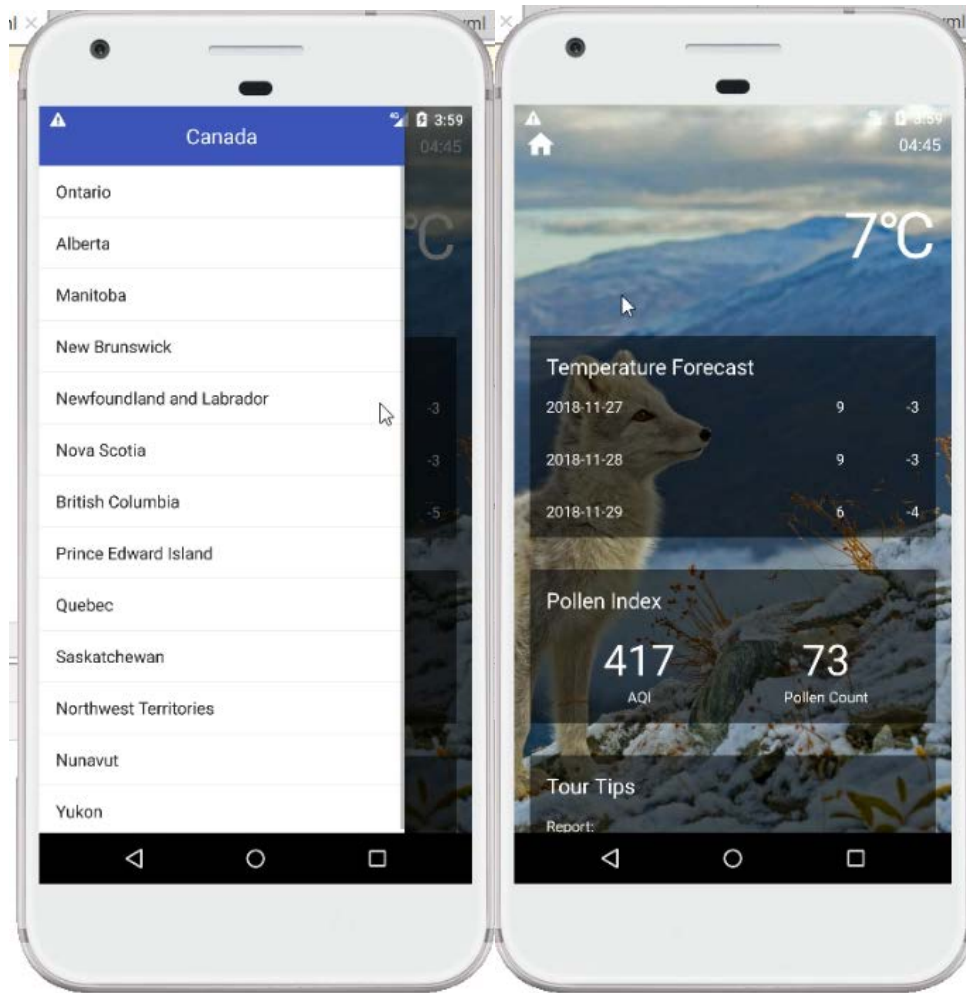
According to this development, Android Studio is the first choice for developing this application. Moreover, for managing the database, “Navicat” is the visualization database management tool, which is convenient for managing database without using command lines.

## Design

**The login layout:**



**The list view page and main activity page:**



For design, this application development mainly includes two parts:

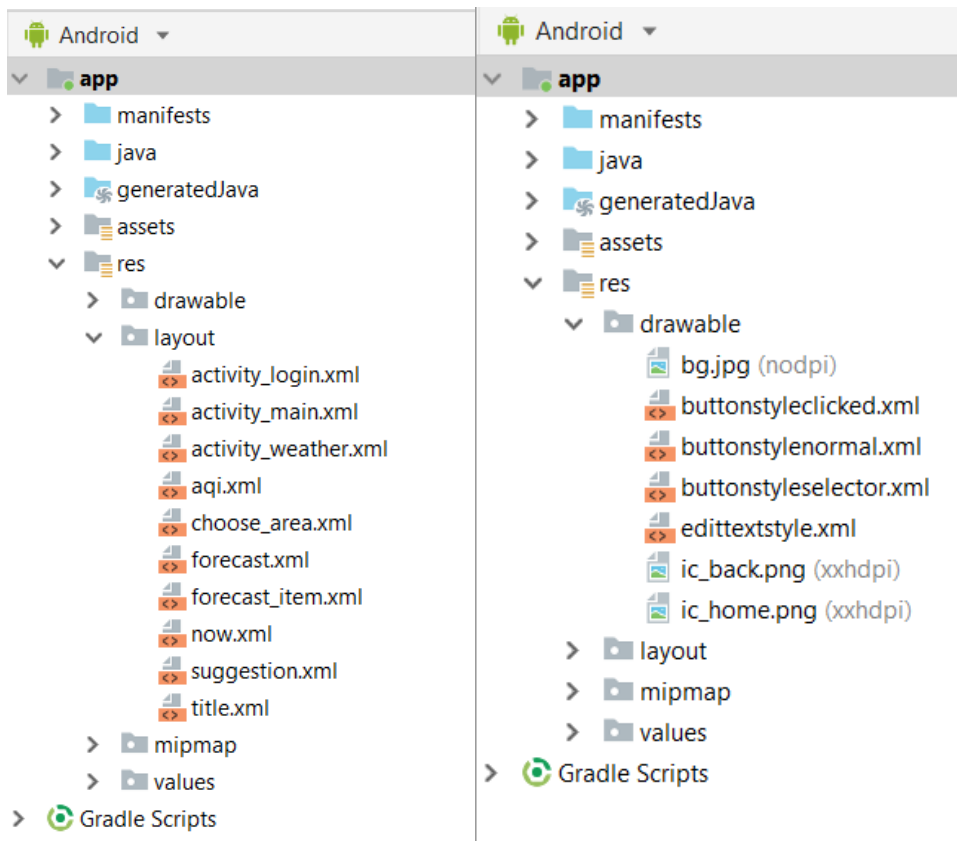
- (1) The front page for Android
- (2) Background data management and interactive design.

Firstly, as the front pages, there are linear layout and relative layout for this application. Relative layout is more efficient and stable for design because this layout will not be changed by changing different IDE.

Secondly, Android Studio internal light database is an appropriate database for storing list and text data. For instance, this application is using SQLite to save some provinces and cities name and storing these information in client devices.

## 5. Experimental setup

### Implementation Details



Most of these layouts are designed by linear layout and relative layout and frame layout. The data that got from API is shown by using fragment on Android. The color and style should be used and implemented from draw able and render the xml files from layout folder. Also, this application uses user - friendly layouts and especially the background picture, which uses “Bing” pictures with its API. So, the background pictures can be changed everyday, which gives users a brand new



experience and makes users not to be tired with using this kind of app and feel comfortable.

id	provincecode	provincename
1	1	Ontario
2	2	Alberta
3	3	Manitoba
4	4	New Brunswick
5	5	Newfoundland and
6	6	Nova Scotia
7	7	British Columbia
8	8	Prince Edward Islar
9	9	Quebec
10	10	Saskatchewan
11	11	Northwest Territori
12	12	Nunavut
13	13	Yukon

id	citycode	cityname	provinceid
1	1	Toronto	1
2	31	Windsor	1
3	32	Belleville	1
4	33	Brockville	1
5	34	Burlington	1
6	35	Cambridge	1
7	36	Caledon	1
8	37	Dryden	1
9	38	Elliot Lake	1
10	39	Hamilton	1
11	40	Kingston	1
12	41	London	1
13	42	Markham	1
14	43	Mississauga	1
15	44	Niagara Falls	1
16	31	Ottawa	1
17	32	Sarnia	1
18	33	Waterloo	1
--	--		

For database, Sqlite is as Android internal database tool fitting for saving light data and calling faster than external database, such as mysql. Moreover, this application utilizing API data to display pollen index which is collected by local pollen monitoring sensor.

## Testing Case

Test Case For Lovely Pollen			
Project Name: Lovely Pollen		Software Version: Pixel 2 API 28	
Order	Testing Steps	Except output	Pass/Failure
1	Click on “Lovely Pollen” menu	Login into application, Main screen show data, Pollen count of a city	Pass
2	Click on “Home” menu	Return back to province list	Pass
3	Click on a province	Step into city list	Pass
4	Click on a city	Step into country list	Pass
5	Click on “Home” menu	Return back to previous menu	Pass

## 6. Future work section

The work section:

- Using more professional data source in commercial
- Building more pollen monitoring sensor for providing in-time data
- Using tremendous scale of data to feed a mathematical model for pollen forecast.

Next Steps

For improving visual effect, we imported ArcGIS SDK to Android Studio and set up development environment successfully. ArcGIS provides powerful functions on data visualization, geospatial data density mapping.

As our next function of lovely pollen app base on the original developed target, predicted pollen count could be mapped to GIS map and presented by gradual changing color base on the count value. Users would have direct sense about the severity level of pollen count by different color.

Another valuable function of ArgGIS could be taken advantage is that spatial analyst. Basing on current geospatial data in the database of Lovely Pollen App, ArgGIS adopts build-in geospatial analyst module to predict pollen count and mappin on a map.

The logic implementation is clear with ArgGIS interfaces;

- 1) Create a mMapView object
- 2) Create a Layer;
- 3) Add the layer created on step2 to an activity

Key hard Coding listed as follow:

```
MapView map=new MapView(this);
map.setLayoutParams(new
LayoutParams.Fill_PARENT,LayoutParams.FILL_PARENT));
tileLayer=new ArcGISTileMapServiceLayer( route parameters);
map.addLayer(tileLayer);
setContentview(map);
```

- 4) Implement colorrender map

```
private class RenderTask extends
    AsyncTask<ClassBreaksDefinition, Void, ClassBreaksRenderer> {

protected void onPreExecute() {
```

```

        dialog = ProgressDialog.show(DynamicLayerRendererActivity.this, "",
            "Generating Renderer");
    }

    @Override
    protected ClassBreaksRenderer doInBackground(
        ClassBreaksDefinition... params) {

        GenerateRendererTask generateRenderTask = new GenerateRendererTask(
            dynamicLayer.getUrl() + "/" + layerid);
        GenerateRendererTaskParameters taskParams = new GenerateRendererTaskParameters(
            params[0]);

        ClassBreaksRenderer resultRenderer = null;

        try {
            resultRenderer = (ClassBreaksRenderer) generateRenderTask
                .execute(taskParams);
        } catch (Exception e) {
            e.printStackTrace();
        }
        return resultRenderer;
    }

```

The challenges we are facing is that geospatial data of pollen count is not accessible easily. Without pollen data presented by geographic coordinate ,it is impossible to implement scientific prediction.

For implementing the function of pollen count prediction, a professional botanist who involve into the projection would be better.

## References

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