

Weather App Using Android Studio

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Abstract – Since the 19th century, mankind has struggled to predict the weather of a particular area. Weather forecasting is a science using which people can predict the weather of an area for a particular location and time. Over the years, scientists have discovered weather patterns using factors like humidity, winds, clouds, temperature, sea level etc. and now the weather predictions are more efficient than before, due to the use of advance technologies and algorithms. Even though there are many advance techniques and technologies, the web apps are very complicated for everyone to use. Especially for the illiterate people. Many of the farmers depend on the weather, which plays a big role in determining the future of their crops. Many times they are not able to use technologies accordingly, and hence I decided to make an app which would show the main details like probability of rain, temperature, humidity etc, just on clicking the app, no other steps required. The app would only require a stable internet connection and GPS.

I. INTRODUCTION:

Weather forecasting is the science and technology to predict the conditions of the atmosphere at a particular place. Human beings have attempted to predict the weather since the 19th century. Earlier, weather forecasting was mainly done by predictions and they were not very accurate. With the development in science and technology, scientists can now predict the weather to a much higher accuracy. Humans are still trying to find the best methods and which have easy pattern recognition skills, tele-connections, knowledge of model performance and knowledge of model biases. The weather predictions are not truly accurate due to the constant changes in weather, the errors involved in measuring the initial conditions and an incomplete understanding of the atmospheric patterns. Hence weather forecasts become less accurate as the time increases.

The use of weather forecast has wide importance in our lives. They are important because they can help us be prepared in case of a weather apocalypse, and help to protect life and property. Forecasts based on rain and temperature helps us in agriculture. Since outdoor activities are severely curtailed by heavy rain, snow and wind chill, forecasts can help us to plan activities around these events and the plan ahead and survive them. The US spends billions every year on weather forecasting. The purpose of this app is to fetch data in need of taking information about the weather worldwide. Another purpose is to generate report and view it on the screen of the mobile phones. The app will be developed in Android Studio in Java language, and the data will be collected from an open source website.

II. Problem Statement

Weather forecasts are used by both private and government industries to plan a widerange of daily activities, protect life or properties. Some of the natural disasters which cause a lot of damage to human life on earth are high wind, flood, cyclone, smoke, fire and fog. Presently, severe advisory and alerts are determined by MOSDAC (Meteorological and Oceanographic Satellite Data Archival Centre).

The biggest problem many people face in this world is that many people are not able to use complex apps, they just need to click and know the weather at a particular time. Not all the smart phones have the features to have a google widget to show the weather. Hence this app will just require the user to click on it and it would show the current weather details to the person.

All that you would require would be a stable internet connection as well as GPS, which are found in almost all the phones now a day.

The data of the weather will be fetched by an open source website and it would be displayed on the screen of the phone in a user friendly way, so that every person could view it without many confusing steps. In the later versions of this app, we could also add some more features like multiple languages to view the weather, but for now it would be seen only in English.

It is important to first understand why people need to find the weather information and where do they turn up to for finding this information. The use and understanding of weather is interrelated and they both affect each other. Lazo et al, did a study on sources and personal interpretation of weather, where he looked at the locations for which people obtain forecasts, individual perception of the important characteristics of a forecast, and the decisions made from the gathered information.

87% times, people use weather forecasts for the city or area in which they live.

72% times, people use weather forecast to stay informed about the weather. Other times, they use weather apps to plan future events.

Respondents most often looked at forecasts for areas within close proximity to their own residence (cities in their region rather than in other states, territories and countries). Location, timing, probability, and type of precipitation along with forecast temperatures are seen as most valuable to users.

The Weather Checking App project seeks to solve these challenges by developing a comprehensive mobile application using Android Studio. The primary issues it aims to address include:

III Objectives -

There are various areas where weather forecast is used. The aviation industry is sensitive to weather, hence, accurate weather reports are required to manage and control the air traffic. Farmers rely on weather conditions to manage their work throughout the day.

Forestry department requires information regarding wind, rain, and humidity in order to control the wild fires. Electricity department also relies on this to predict the demand. Other commercial companies also pay for weather forecasts so they can increase their profits or avoid large losses. The main objective of this app is to show weather of a region in a user friendly manner, so that it is easy to be viewed by majority of the people. The scope of this app will not be too broad. On the contrary, it will be narrowed down to few functions which are mainly needed. The main functions involve temperature and probability of rain.

The use of weather forecast has wide importance in our lives. They are important because they can help us be prepared in case of a weather apocalypse, and help to protect life and property.

Forecasts based on rain and temperature helps us in agriculture. Since outdoor activities are severely curtailed by heavy rain, snow and wind chill, forecasts can help us to plan activities around these events and the plan ahead and survive them. The US spends billions every year on weather forecasting.

IV. Methodology

Basically, every android user will be able to access this app.

Step 1: Since the app will be made in Android Studio, we will first need to make a java project and add the libraries like Picasso and gson. Gson is a Java library that can be used to convert Java Objects into their JSON representation. It can also be used to convert a JSON string to an equivalent Java object.

Picasso is one of the most popular library for android. It is very simple and powerful library for image downloading and caching.

Step 2: The data of the current weather report is fetched from an open source weather website. So we need to create a java class so that we could connect the application to the weather application. This is done using the website openweathermap. I have obtained the data of the website by fetching the link and the key of the website.

Hence, to fetch the current data we require a stable internet connection.

Step 3: Using the key we have obtained the data which will give us information like amount of clouds, maximum temperature, minimum temperature, pressure, precipitation, etc. So we need to create separate classes in a package so we can fetch these details separately.

Step 4: Then we have to make a main class where we will display the City name, the last updated time, description of the weather in one word, the amount of humidity, the current time and the temperature in Celsius.

Step 5: In the final step we have to make changes in the display of the app that will be reflected when we run it.

V. Hardware and Software Requirements:

Summary:

The intention of developing weather app is to fetch the data in the need of taking information about weather worldwide. Another purpose for developing this software is to generate the report automatically at the end of the session or in the between of the session or in the between of the session as they require. This project is basically a desktop application which means 3 self-contained software runs on which it has been installed under the user control.

The outputs from the organization are traced to the various processes. System analysis is concerned with becoming aware of the problem, identifying the relevant and Decisional variables, analysis and synthesizing the various factors and determining an optimal or at least a satisfactory solution or program of action.

The system working is quite easy to use and learn due to its simple but attractive interface. User requires no special training for operating the system.

Hardware Required

- Standard computer with at least i3 processor Standard computer with 4GB of RAM.
- Standard computer with 100GB of free space.
- Active Internet Connectivity with good bandwidth.

Software Required

- Android Studio
- Ms Office
- Draw.io

VI. Weather on the go: An Assessment of Smartphone mobile app use:

Summary: Millions of people in the United States regularly acquire essential information from weather forecasts for a wide variety of reasons. A myriad of sources exists for obtaining daily weather information, and the rapid growth in mobile device technology has created a very convenient means for people to retrieve this data. Smartphone and technology use have soared in recent years, and mobile weather applications (MWAs) have also rapidly gained popularity.

Research on weather sources, however, has been unable to sufficiently capture the importance of this form of information gathering. As use of these apps continues to grow and the market expands with increasing options, it is important to gain insight on which MWAs and what MWA features are most useful to consumers. To better examine MWA preferences and behaviours relating to acquired weather information, a survey of 308 undergraduate college students from three different universities throughout the southeast United States was undertaken.

Analyses of the survey showed that smart phone MWAs are the primary source among college students for seeking weather forecasts. Additionally, MWA users tend to seek short-term forecast information, like the hourly forecast, from their apps and spend very little time using the app itself. Additional results provide insight on daily MWA use by college students as well as perceptions of and preferential choices for specific MWA features, designs, and various brands in the weather enterprise.

The information gathered from this study will allow other researchers to better evaluate and understand the changing landscape of weather information acquisition and how this relates to the uses, perceptions, and values people garner from forecasts. Companies and organizations that provide weather forecasts have an ever-growing arsenal of resources to disseminate information, making research of this topic extremely valuable for future development of weather communication technology.

VII. Activity Diagram

In the app, first of all, the GPS will help to select the city, where the weather has to be checked. If the location is a valid location, then we will proceed else, an error message will be displayed on the screen, saying invalid City.

After the city is verified as a correct location, the app will fetch data from the open source website and we will be able to access the weather location.

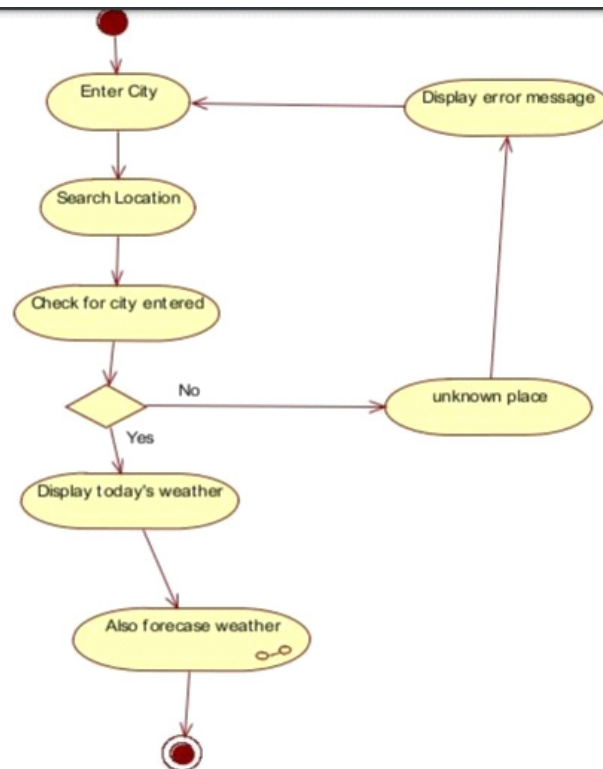


Figure 1:Activity Diagram

Activate Wind
 Go to Settings to a

7.1Class Diagram:-

The basic class diagram can be seen below. The user requires having a smart phone with a data plan for accessing internet and GPS should be on because the app selects the city through it. The user then requires to install the weather app on his smart phone.

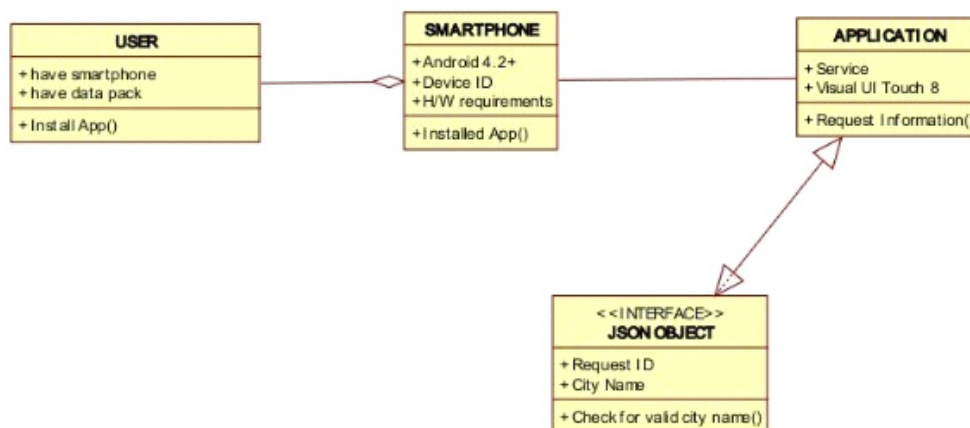


Figure 2: Class Diagram

VIII. PERFORMANCE ANALYSIS

Forecasting is more accurate than ever, but still there is wide variety in the mobile apps available in play store. So, the biggest question lies, what is the difference and which one is the best.

Foundation of modern forecasting involves collecting huge amount of data from different sources that were previously mentioned. Gaps of data are filled using a process called extrapolation. Then, using several equations, in a supercomputer, which can perform a thousand trillion calculations per second, weather, is predicted.

But the main difference comes from the main variable and the variables relying on it and the fact that different people consider different parameters as the main variable. Eg: Some might take temperature, rain or wind conditions as the main variable. Every time the prediction of weather will be slightly different from the other one. Eric Floehr, founder of ForecastWatch, a company that analyses performance of weather apps says that different forecasters perform better on different measures, longer or shorter timeframes or in a certain geographical regions.

Hence we can understand, due to the difference in selection of the main variable, some apps are able to show one parameter of weather better than the other one. One application may be better for temperature averages and highs, probability of precipitation and wind speed; the other might be better for low temperature predictions.

To know everything about the weather, you will need to model every single particle in the atmosphere and all the interactions between them, which is not theoretically possible, because the computer doing the modelling would produce so much heat and become part of the system, and then need modelling. So no weather forecast will ever be perfect.

IX. Results at various stages

9.1 Steps taken by the Open Source website

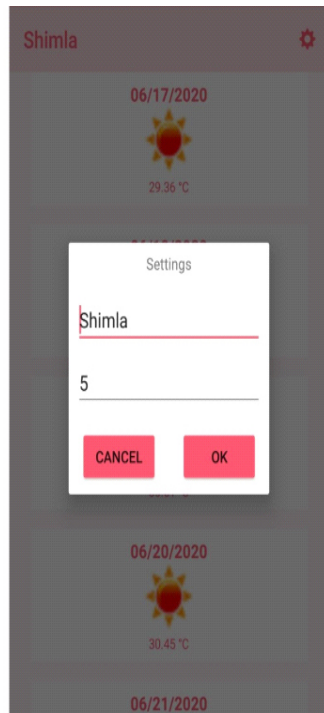
- Climate API: Climate forecast for 30 days

9.2 Steps taken in development

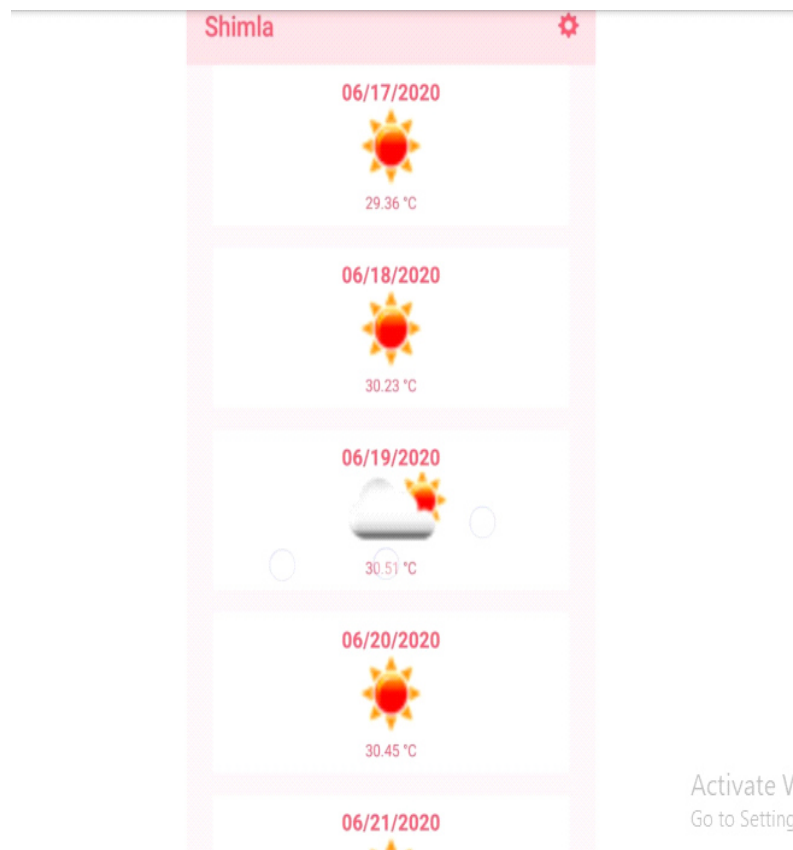
- The app is very easy to use because the automatic location is selected by typing the name of that city, and then mentioning the number of days for which you need to find the forecast.

9.3 Output at various stages

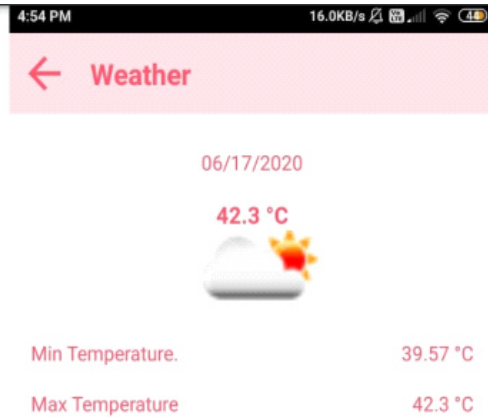
Step 1: Enter the name of the city in the first box, that is typed as Shimla here. Then write the number of days for which you need to find the forecast.



Step 1 of operating the application



: Step two of operating the application



Activat
Go to Se

: Min Max temperature

X. Comparison

In the first place, machine learning is when the machine learns data iteratively to find patterns and characteristics hidden in the data. By incorporating machine learning you can improve the accuracy of data analysis and make the best choice.

An example of the use of machine learning in the immediate world is that a certain manufacturer extracts key words from text data based on questionnaire surveys from customers to help improve their business, such as complaints and requests, to improve customer satisfaction.

In medical practice, it is used in medical fields to search a huge database of patient symptoms and predict the future illness of a specific patient. He also plays a role in exploring huge databases using time-series analysis to predict future stock price fluctuations. In this way, machine learning is used even in our immediate surroundings.

XI. Future Scope

Right now the application just fetches the result from the website and displays the result on the screen of the emulator. In the future the following may be added to the app:

- More options so that we could view temperature in ranges like forecast for seven days, for a month and detailed weather all throughout the day.

<https://doi.org/10.69758/GIMRJ2406I8V12P090>

- In case of an upcoming weather calamity in your region, it should be able to show some notifications to alert the user ahead of time.
- The application has only one language English right now, but in the future we might even add more languages to make it more user friendly.
- It could display the sunrise and sunset times.
- To make it more interactive, we can add a feature of time lapse, so that we can view images of change in the climate at regular intervals.
- Humidity and visibility
- Image of changes
- Push notifications

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