System Request

Weather Prediction & Clothing Recommendation Application

29 January 2023

General Description

The system our team is planning to develop is a program to measure error in weather forecasting. For any given day's weather forecast, we want to know "Was this weather forecast wrong?" and "If so, how wrong was it?". This will be displayed as a "Prediction error" of both degrees (℉) and chance of precipitation (%). A 3-day weather forecast will also be displayed for functionality as a weather app/website.

The program will also recommend an outfit choice for the given weather. Based on a user's location and that location's weather, it will display a printed list of recommended articles of clothing such as "t-shirt, long pants, sunglasses" or perhaps "winter coat, heavy pants, thermal layers, boots." This will aid people who struggle with decision making early in the morning and will use technology to create a frictionless and accurate morning routine.

Many people have an interest in proving technology wrong; from trying to beat the GPS on one's way home to realizing a snowstorm was predicted on a bright and sunny day. We hope this program can satisfy that curiosity many people have: How much better is technology than our intuition or suspicions?

Business Needs

This application offers a solution to the common issue of not being prepared for the weather. There are an abundance of weather mobile applications, websites, etc. currently available; however, all of these only use predictions and current conditions directly from sources such as the National Weather Service and Wunderground. Unfortunately, these lack data from past predictions and conditions which can be invaluable in evaluating the probability of future

weather predictions. With inaccurate forecasts, it can be impossible to be properly prepared for the weather for the day ahead. Being over-bundled during days that were supposed to be colder than they ended up being, not bringing a rain jacket because the day was supposed to be clean and getting caught in the rain, and being underdressed during cold weather are just a few of the issues caused by incorrect weather predictions. Comparing prior weather forecasts and the actual weather that occurred on past days, our application will provide additional insight into the likelihood of inclement weather. Analyzing previous error, our application will be able to better convey to the user the likelihood of inclement weather. Partnering this ability with clothing recommendations, the application will do better than its competitors to prepare users for the weather throughout the day.

System Benefits

This system will provide a number of benefits to its users. It can help people plan their day by suggesting clothing items for them to wear and will give backup suggestions based on the error percentage of the weather predictions. This service will provide more detail in weather predictions as error percentage is not typically displayed. This can be especially helpful when planning outdoor activities and will be a valuable addition to anyone's daily routine. Users will find that this app will bring them comfort and help to avoid mistakes with clothing choices. Poor planning in regards to clothing can damper a great experience and we want to eliminate that problem for all of our users. This app will have a user friendly interface where users can quickly access all of its features. The target audience for this app is a wide range. Due to the app's usability and clarity, it will be used by people of many different ages and backgrounds in their day to day lives. The main selling point of this app will be convenience and reliability.

Existing Systems

The app Weatherfit has similar features to the service that we are going to create. This app shows the current weather and the forecast for different times of the day. It also shows outfit ideas for users in the form of an animated picture. There are pros and cons to this app. It displays the weather clearly and the use of animated pictures makes their clothing suggestions clear. You can scroll to the right and different pages are displayed with outfit suggestions and weather predictions for different times of the day.

What separates our service from one like this is that the service that we are implementing can provide a more detailed and accurate weather forecast as we take error into account and are transparent with our users. This app will not only provide suggested outfits but will also offer backup clothing ideas based on the error percentage. This is a service that is not currently available to users.

Technology

This system will be required to pull data from weather sites, store and access historical weather data, have a clean and concise graphical user interface (GUI), maintain a database of recommended articles of clothing for weather conditions, and access the GPS location of the used device.

To access data from various weather sites, the application will need to utilize one or more APIs to receive weather conditions from stations across the country. In preliminary research, we have identified two APIs that will likely be used in the development of the system: OpenWeather and WeatherAPI. Both API have free pricing options that allow for 1,000,000 calls to receive weather conditions at any location. For our uses, OpenWeather seems to be a more favorable choice as it allows calls to access past forecasts for an area. This would minimize storage of data for the application.

To create a user interface for the application, an IDE with easy-to-use GUI creation tools will be needed. While the creation of a visually appealing interface is not vital to the functionality of the application, having one that is simple, clean, and visually appealing at gives the application

favorability compared to other less nice looking weather applications. Looking into solutions for this, we have identified two frameworks that members of our team are proficient in: QtCreator and Android Studio. Each framework allows for quick

GUI creation and will support backend functionality for the application. Accessing GPS location

will highly depend on which framework is chosen as well, as most offer some sort of built-in GPS calls.

For storing clothing options for different weather conditions, the system will need to support a database where each type of clothing can be linked to specific weather conditions. For example, for winter snowy conditions a parka might be linked. Frameworks such as SQLite and mySQL will be researched for this purpose.

Lastly, the development of the system will need version control to track both changes in documentation and in software. For this, the team is considering using a Git product such as GitHub. Using a Git product will allow developers to simultaneously make changes within the project with an easily maintainable document and software baseline. Keeping baselines for documentation and software will ensure each team member will be modifying the most updated versions of the file and still keeping a most functional/working version.

Constraints

The most significant constraint the system will face will be development time during the implementation phase. Based on our current schedule, development time will be limited to a few weeks. This could cause cuts to functionality of the application as we would be forced to develop only the most vital parts of the application. As such, our requirements should remain open enough to allow the team some wiggle room for what we need to develop.