WEATHER FORECASTING SYSTEM FOR CROP GROWTH PREDICTION

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ABSTRACTS

Weather Forecasting is the application of science and technology to predict the atmosphere of a location. Usually, for forecasting of weather, we usually record the pattern of weather of past days and then predict the future weather. Farmers can plan their farming activities according to the forecast. Here, we are creating a web application of weather forecasting using HTML, CSS, JavaScript and API. This application mostly uses API, so we will be determining how to use API, and how API calls are made. This application gives information about the future weather so that people can plan activities in day-to-day life. Also, this application gives information about air quality in a particular area where the people can determine how clean or polluted the air is, and what will be the health issues if we breathe polluted air. Graphs are provided to give visual representation of weather parameters like temperature, humidity, wind speed, etc. For crop prediction, we use collaborative filtering which is used for prediction of user preferences in item selection according to the ratings of user items in the present data.

1. INTRODUCTION

Weather forecasting has been one amongst the foremost scientifically and technologically difficult issues round the world within the last century. Weather Forecast systems are among the foremost advanced equation systems that computer needs to solve. This most advances scientifically and technological modification is attributable to two factors: 1st, it's used for several human activities and second, attributable to the resourcefulness created by the varied technological advances that are directly associated with this concrete analysis field, just like the evolution of computation and therefore the improvement in activity systems. Weather Forecasting is used to predict the atmosphere of a location [4][5]. This web application is used to provide the same with some more additional activities, like current weather of a particular area, historical weather of past days, air quality index and maps supporting the current weather [2]. There are many methods for which we can predict the weather, which start from looking up at the sky (which was used anciently) to complexed computerized models. Nowadays, Data Science is growing and with that technology, we can also predict the weather. For this web application specifically, we are using APIs to access data,. Before getting straight to the API calls, this project is made in HTML, CSS, JavaScript and MySQL. HTML is used to create frontend of the website to which

user interacts. CSS is used to make the frontend more attractive so that user can easily use that website with more interest.

API is Application Programming Interface, as it says it is an interface, which allows to talk between the two application. Here the API, the web application is using it. OpenWeatherMap API is powered by ML technologies [7], which provides all necessary business weather information forany location of the globe. The AirPollution API provides access to location based air pollution data via simple RESTful web interface [2][13]. Air pollution is also one of the major impacts on human because air contains oxygen and we need oxygen for breathing [1].

Here is image of table containing the classification of air quality index:

Fig 1. Air Quality Index

Collaborative filtering is basically a combination of two words – collection of preference of users(collaborative) and making predictions automatically(filtering) [10]. Here we make use ofthis by comparing the weather and according to it predicting which crop is best for growth in that particular weather. Also based on the user, we shuffle the crops and recommend the best one to be sown [8].

Here we use of collaborative filtering for recommending the best crop suited for the weather condition present on that particular location.

2. PROBLEM STATEMENT

Nowadays, Weather plays a very important role in human's daily life. Weather makes human to plan his/her day to day activities. This project proposes a web application to display current, future and historical weather according to the given location with the help of API and with crop recommendation for the users (farmers basically) with the help of collaborative filtering.

3. LITERATURE SURVEY

Weather forecasting has been one of the most challenging difficulties around the world because of both its practical value in popular scope for scientific study and meteorology. Weather is a continuous, dynamic, multidimensional chaotic process, and data-intensive and these properties make weather forecasting a stimulating challenge. It is one of the most imperious and demanding operational

responsibilities that must be carried out by many meteorological services all over the globe. Various organizations / workers in India and abroad have done demonstrating using supported time series data manipulation. The various methodologies viz. statistic decomposition models, Exponential smoothing models, ARIMA models and their dissimilarities like seasonal ARIMA models, vector ARIMA models using flexible time series, ARMAX models i.e. ARIMA with following informative variables etc., which has been used for forecasting purposes. Many trainings have taken place within the analysis of pattern and circulation of rainfall in many regions of the world. Totally altered time series methods with different purposes are used to investigate weather information in many different literatures. Accurate and timely weather forecasting is a major challenge for the scientific research. Weather prediction modelling involves a combination of many computer models, observations and acquaintance of trends and designs. Using these methods, practically accurate forecasts can be made up. Regression is a statistical experimental technique and it must be widely used in many businesses, the behavioural sciences, social and climate recasting and many other areas.

A. A Web API and Web application development for dissemination of Air Quality Information (Kevser Sahin, Umid Isikdag)

In this paper the agenda of study is to make a web service for air quality for checking the quality of air for preventing a dangerous situation. This paper is basically proposed a system for Air Qualtiy Management in Turkey and also shown the limitations of previous methods used. Here they have also used the visualization methods for showing the air quality based on the map of the region.

Basically, they have shown how the basic RESTful Web API development works.

B. Development for REST API for obtaining Site-specific historical and near-future weather data in EPQ Format (Hu du, Eva Lucas Segarra, Carlos Bandera)

This paper shows how to get real-time current and forecast weather in QPW format using online toolchain which further can be used as an API for building simulation community.

C. Java based Webcentric Approach for Weather Prediction Using the ARPS Model (Gopal Racherla, Adwait Sathye, Anindya Das)

The agenda of this paper is to create a tool to use computers for science rather than to use computer as a platform and this Java for the ARPS is a step in the same direction and how this helps in the weather prediction for a particular location.

D. Survey on Weather Forecasting using Data Mining (Christy Kunjumon, Sreelekshmi Nair, Deepa Rajan, L. Padma Suresh, Preetha S L)

The main purpose of this paper is to show how data mining is used for weather forecasting and the different types of data mining algorithms like naïve bayes are used for obtaining more accurate results on the same.

E. Weather Forecasting Using Sliding Window Algorithm (Piyush Kapoor, Sarabjeet Singh Bedi)

This paper shows how the variations in the weather conditions in the past years be utilized for predicting the future weather to get more accuracy and efficiency of the weather forecast.

F. Weather Forecast Prediction: An Integrated Approach for Analyzing and Measuring Weather Data (Munmun Biswas, Tanni Dhoom, Sayantanu barua)

This paper deals with the weather prediction using chi square and naïve bayes algorithms where the current weather data is taken into the dataset and extracted to get useful information for prediction.

G. Weather Forecasting using Machine Learning Algorithms (Nitin Singh, Saurabh Chaturvedi, Shamim Akhter)

This paper presents a model in which raspberry pie 3 B is used for using ML Algorithms and then predicting the weather, also some of the hardware like barometer pressure sensor for calculating the air

pressure.

H. Improvement of Crop Production Using recommender system by Weather Forecasts (S Bangaru Kamatchi, R Parvathi)

The paper proposes a system for best crop recommendation by using weather conditions and ANN as algorithm showing improvements that can be suitable for the crop considering the current, historical and future weather.

I. Collaborative Filtering System for Agriculture Sector (Sapna Jaiswal, Tejaswi Kharade, Nikita Kotambe, ShilpaShinde)

The agenda of this paper is to use collaborative filtering for giving the best accurate information to the farmers about the agriculture sector which includes updating farmers on the recent trends in crop production, government schemes and programs

4. Proposed System

We have created a simple web application using HTML, CSS, JavaScript and MySQL for weather forecasting and displaying various weather parameters. We have also used API's for collecting data and displaying it in the web application for accurate conditions and to make the application reliable.

Basically two API's have come across this web application, OpenWeatherMap API, Airpollution API. Weather data in this application includes the current weather, weather forecast of 5 days, airpollution data, i.e. the air quality index. We can also see the weather on different location where we have given a search option of city in current weather, and latitude and longitudes for weather forecast and air quality index. For crop recommendation, we have used collaborative filtering which takes the data from the combination of user data and weather data and gives efficient prediction on the future crop to be grown so that it helps farmers to prevent their land and produce a healthy crop in his/her land without any damage or any destruction to the land and the crop.
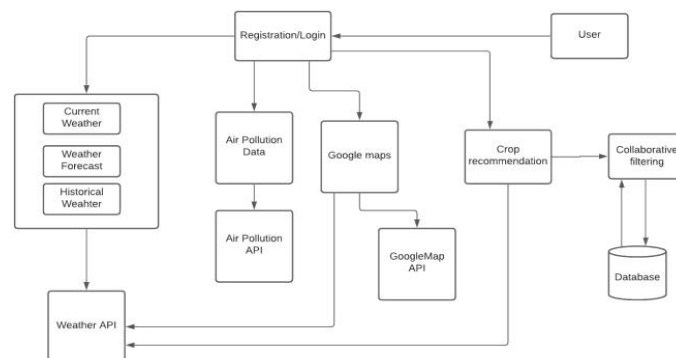

Fig.2. System Architecture

A. Login System

This is a basic login system where the user can create a new account or use existing account for logging in to see the weather conditions. For creating an account user has to enter basic information like name, email id, mobile number, password, etc to save his data into the database.

B. Weather components

1. Current Weather

This is the welcome page after you log in. This will show the current weather data according to the device location in which you have logged in. It has parameters like the city name, temperature, etc. We can also extract the weather conditions of any city according to our choice using the search box which takes input as city name and this data is fetched from the API called OpenWeatherMap API.

2. Weather Forecast

This is the main component where we can see the future weather conditions of the next coming days. Here also the option of latitude and longitude is given for the user to track weather forecast of any location.

3. Air quality

This component takes latitude and longitude of that area as the parameter of weather to check the air quality. Same as weather forecast, we can use the latitude and longitude.

4. Crop recommendation

This page shows the user which crop to use for the weather condition according to the location of user's will. Here collaborative filtering is used to collect data from all other users and checking the crops for the suitable weather.

5. RESULT

After looking at the previous works that have been done to forecast weather, including the study of the papers and planning the project implementation, we can say that the project provides better accuracy of weather and is more efficient.

We can say that weather is one of the most important factors for human. And how the future weather can make human plan his day-to-day life. Also, we have used crop recommendation as one of the applications of weather forecast to show how weather impacts the crops and which crop is suitable for which condition.

6. CONCLUSION

Presently our farmers are not effectively using technology and analysis, so there may be a chance of wrong selection of crop for cultivation that will reduce their income. To reduce those type of loses we have developed a farmer friendly system with GUI, that will predict which would be the best suitable crop for particular land. Predicting weather accurately doesn't just help our daily lives but has deeper impact for food security and disaster management. Good news for monsoon-dependent India is that we are getting better at predicting.

New technologies, such as Internet of Things (IoT) and Artificial Intelligence (AI) are helping meteorological experts to give better information to predict agricultural output and natural disasters.

7. REFERENCES

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