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# Design and Implementation of Weather Forecasting System using Machine Learning

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***Abstract*— Weather is a vital part of a person's life because it can tell us whether it will rain or be sunny. Weather forecasting is meteorologists' attempt to predict weather conditions in the future, as well as weather conditions that may be predicted. Temperature, pressure, humidity, dew point, rainfall, precipitation, wind speed, and dataset size are all used to calculate the climatic state parameters. To begin, the data must be educated. We can use 75-90% of the data from the data collection to train the data. User can predict daily weather report using the particular dataset which is already imported like API. Here API is vital role for current data. Here one of the main feature is Speech Recognition (like alexa). It will ask question and user can ask query which will send result. Mainly this will helpful for blind people. Based on this user can get output for weather without click anything. If user want to access directly they can go with visualization. Using this project user can get current weather report and only need the input of name of the city once enter the city name full report will be generated for current situation. We can analyze the predict temperature with original temperature and can predict future rain fall. We'll use the Linear Regression Algorithm and the Nave Bayesian Classification Algorithm to make this prediction. Python, NumPy, Jupiter Notebook, Spyder, and Panda will be used in this project. The project is split into three separate Jupiter Notebooks: one to collect the weather data, inspect it, and clean it; a second to further refine the features and fit the data to a Linear Regression model and Naïve Bayesian model and a third to train and evaluate our output.**

***Index Terms*—Machine Learning, Linear Regression, Speech Recognition, Nave Bayesia, Weather Prediction**

## I. INTRODUCTION

A Weather prediction is used to predict the current weather situation. The application of physics principles, augmented by a range of statistical and analytical methods, to predict the weather is known as weather forecasting. Weather forecasting provides forecasts of shifts in the Earth's surface temperature in addition to predictions of atmospheric phenomena. These shifts are influenced by atmospheric conditions such as snow and ice cover. The foundation for weather prediction began with ancient Greek philosophers' theories and continued with Renaissance scientists. Any weather prediction requires a systematic compilation of weather records from different locations, as well as adequate data analysis and prediction.

The objective of this application is that it saves time, simple and efficient. It is mainly to avoid scared about weather related problems. The blind people can also handle this application.

We have developed the system in such a way that it can be used efficiently by all the users. Let's Assume all the webpages and logics related to admin and users as separate modules. We have two modules and each of these modules have their own unique functions. Important thing is that it is not designed for particular type peoples. This application can help all the users to access the weather report details through internet or intranet that means anytime and anywhere. We wanted to create a tool that fits into modern age, but still stays true to the "concepts of studying". So, this process also helps in maintaining consistency and integrity. This system helps the user to generate the dynamic legwork.

## II. LITERATURE REVIEW

The goal of weather prediction is to provide information people and organizations can use to reduce weather-related losses and enhance societal benefits, including protection of life and property, public health and safety, and support of economic prosperity and quality of life. In economic terms, the benefit of the investment in public weather forecasts and warnings is substantial: the estimated annualized benefit is about $31.5 billion, compared to the $5.1 billion cost of generation the information.

The main aim of this project is predict the weather report and should be useful for all kind of peoples. Based on this type of application we can avoid unwanted weather related problem. The Linear Regression algorithm, which is used to forecast weather using these data, is at the center of this project, the higher the precision, the more parameters considered. This project has the potential to assist a large number of people in predicting tomorrow's weather. Temperature, dew, pressure, and humidity are simply used to train the data in this project. These data are then used to train a prediction model using Linear Regression.

## III. EXISTING SYSTEM

The peoples cannot know rainfall, snow etc.., and they couldn't be able to prevent from that natural disaster. Though using this application one can easily find out their current weather situation in live location.

The people cannot know the current weather situation. So that the people face many issues (like people going for outside purchase during the rain fall). Abstract weather problem is defined in many areas and it's hard to solve, because it includes many constraints that should be solved.

Its doesn't have analysing process.

Takes a lot of time. • Less Accurate. • Not capable to contain all the information. • Separate social media required. • High complexity and additional setting efforts.

## IV. Proposed System

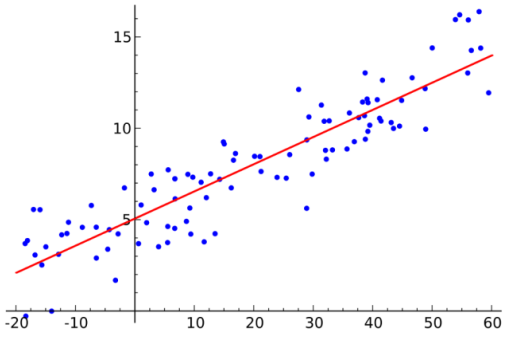
The fundamental idea behind my project is to create a website that would make greater this easier. I wanted to create a tool that fits into modern age, but still stays true to the concepts of studying. Following is the detail of different modules of my project.

Using this application we comes to know the weather situation in live locations. This application dashboard contains speech recognition, current weather report for specific city, Analyze average rainfall for every month in India, Rainfall predict the Tomorrow, Predict the temperature for year, comparing original temperature vs predict temperature. Speech Recognition The blind people can also access this project using this features. Its option features the user can take this option once if need. Current weather report for specific city Using this feature the people can know current weather report for live location and specific city. Its contains humidity, temperature, etc…, Analyze average rainfall for every month Using this feature one can analyse the monthly fall rain level. Based on this we can analyse the rainfall and predict the rainfall for next year. Rainfall predict the tomorrow Using this feature one can predict the rainfall will happen for tomorrow or not Predict the temperature for every year Using this feature can predict the temperature for yearly and analyse. Comparing original vs predict temperature Using this features the developer can comes to know the difference between the original to predicted temperature.


Fig 1: Data Flow Diagram

## V. Methodology

Linear Algorithm Regression is a method of modeling a target value based on independent prediction. This method is mostly used for forecasting and finding out cause and effect relationship between variables. Regression techniques mostly differ based on the member of independent variables and the type of relationship between the independent and dependent variable.




Naïve Bayes Classification Naïve bayes algorithm is a probability machine learning algorithm which can be widely used in various classification tasks which is based on Bays theorem. The term naïve is given because is assumes the data that is given so the model are independent of each other, that is they have independent distribution. So, if we change the value of one feature than it doesn't affect the value of other features used in the algorithm.

## VI. Module Description

Features selection The data we have collected has many unwanted attributes which will not be needed in our project. Hence, we use the attributes which we need only. Normalization The data we collected from internet should be first normalized. Normalization refers to rescaling real valued numeric attributes into the rage or 0 and 1. After the data are filtered it is then normalized. Machine Learning Training a model is the process of iteratively improving your prediction equation by looping through the dataset multiple times, each time updating the weight and bias values in the direction indicated by the slope of the cost function (gradient). Training is complete when we reach an acceptable error threshold, or when subsequent training irritations fail to reduce irritations.

The system must provide the predicted weather. ¬ The system must have an easy to use interface for using the system for all the users. ¬ The Admin must be able to update/modify the Dataset. ¬ The Dataset of the weather must be available for the system.

The project aim is to show the weather report for everyone. This project used to show the report for all attributes and user can easily know about the weather forecast, chillness, sunset, sunrise etc…, According to that the user comes to know weather problems. Here speech recognition also included for extra one feature. Despite of the blind people also able to work with it. Using the API included all kinds of weather attributes. From the data collection, we know the weather report either current or specific city which is defined by users. The Government can analyze every year or every month wise rainfall level in order to that we can predict rainfall for future year or month. Based on comparing the original versus

predicted temperature the developers can find the difference of the temperature.

We will work on forecasting the average global land and ocean temperature using over 100 years of historical weather data. We'll pretend that we don't have access the any weather forecasts. Through a comparative study of weather data collected in Central Kerala from 2007 to 2015. We propose a system for temperature prediction using three machine learning models. Multiple Linear Regression (MLR), Artificial Neural Network (ANN), and Support Vector Machine (SVM). We still have a century's worth of historical global temperature averages, including global maximum and minimum temperatures, as well as global land and ocean temperatures. Having all of this, we know that this is a supervised, regression machine learning problem. Mean Error (ME), Mean Absolute Error (MAE), and other metrics are used to assess the experimental outcomes.

Get the current weather report for a location by city name. Using this we can get the temperature for current location get to know temperature, humidity, chill, cold etc…, The OpenWeatherMap API currently provides a wide variety of weather data including current weather, forecasts, historical, weather stations and weather alerts. The API documentation is comprehensive, easy to follow and includes many examples of API requests and the responses returned.

Between 1980 and 2009 - 96 weather disasters in the United States each caused at least$1 billion in damages, with total losses exceeding $700 billion (NCDC, 2010). ¬ Between 1999 and 2008 - there were an average of 629 direct weather fatalities per year (NWS, 2010). ¬ The annual impacts of adverse weather on the national highway system and roads are staggering: ¬ 1.5 million weather-related crashes with 7,400 deaths, more than 700,000 injuries, and $42 billion in economic losses (BTS, 2007). ¬ In addition, $4.2 billion is lost each year as a result of weather-related air traffic delays (NOAA, 2010). ¬ Weather is also a major factor in the complex set of interactions that determine air quality; more than 60,000 premature deaths each year are attributed to poor air quality (Schwartz and Dockery, 1992).

## VII. CONCLUSIONS

A weather prediction goal is show the weather report for everyone. This project used to show the report for all attributes and user can easily know about the weather forecast, chillness, sunset, sunrise etc…, According to that the user comes to know weather problems. Here speech recognition also included for extra one feature. Despite of the blind people also able to work with it. Using the API included all kinds of weather attributes. Weather forecasting using the linear regression algorithm and the Naïve Bayes algorithm is critical for improving people's future results. The linear regression algorithm and the Naïve Bayes algorithm were used to forecast the weather using weather datasets. Using some selected input variables obtained from kaggle, GitHub we created a model to predict the weather. The issue with the current weather situation is that we are unable to organize ourselves and complete essential tasks. As a result, this model was developed in order to know the weather scenario with high precision while taking into account all of the factors that influence the weather scenario.

A weather prediction technology can stipulate university growth and development. The scope magnitude of change that are occurring in department today are both exciting and daunting, very particularly we are contemplating how we will manage the many streams of technological innovations pouring into our department and networked information world. All the social medias combine to create one. This application should need to know to avoid natural disaster. To overcome that problem we have improve this to advanced features included. And then using speech recognition we need to pronounce correctly or else it will not work correctly. So that need to improve without this critical.

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