A Project Report

On

"IOT Weather Reporting System"

Project Report submitted in partial fulfillment for the award of the degree of

Bachelor of Technology in Computer Science and Engineering

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Under The Supervision of:

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Assistant Professor
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Submitted By

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SCHOOL OF COMPUTING SCIENCE AND ENGINEERING DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING GALGOTIAS UNIVERSITY, GREATER NOIDA, INDIA DECEMBER - 2021

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA

CANDIDATE'S DECLARATION

We hereby certify that the work which is being presented in the thesis/project/dissertation, entitled **"IOT WEATHER REPORTING SYSTEM"** in partial fulfillment of the requirements for the award of the B.TECH of School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of September, 2021 to December,2021 under the supervision of Garima Pandey(Assistant Professor), Department of Computer Science and Engineering, Galgotias University, Greater Noida

The matter presented in the project has not been submitted by us for the award of any other degree of this or any other places.-

Altaf Ahmed Khan(19SCSE1010501)

Rishabh Bajpai(19SCSE1010551)

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Garima Pandey
Assistant Professor

CERTIFICATE

The Final Project Viva-Voce examination of Altaf Ahmed Khan(19SCSE1010501) and Rishabh Bajpai (19SCSE1010551) has been held on 24 December,2021 and their work is recommended for the award of B.TECH

Signature of Examiner(s)

Signature of Supervisor's

Signature of Project Coordinator

Signature of Dean

Date: 26 December, 2021
Place: Greater Noida

ABSTRACT

Traditionally, weather predictions are performed with the help of large complex models of physics, which utilize different atmospheric conditions over a long period of time. These conditions are often unstable because of perturbations of the weather system, causing the models to provide inaccurate forecasts. The models are generally run on hundreds of nodes in a large High Performance Computing (HPC) environment which consumes a large amount of energy. In this paper, we present a weather prediction technique that utilizes historical data from multiple weather stations to train simple machine learning models, which can provide usable forecasts about certain weather conditions for the near future within a very short period of time. The models can be run on much less resource intensive environments. The evaluation results show that the accuracy of the models is good enough to be used alongside the current state-of-the-art techniques. Furthermore, we show that it is beneficial to leverage the weather station data from multiple neighboring areas over the data of only the area for which weather forecasting is being performed.

Keywords:

Weather forecast, Machine Learning, data preprocessing

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CHAPTER 1: INTRODUCTION ABOUT PROJECT

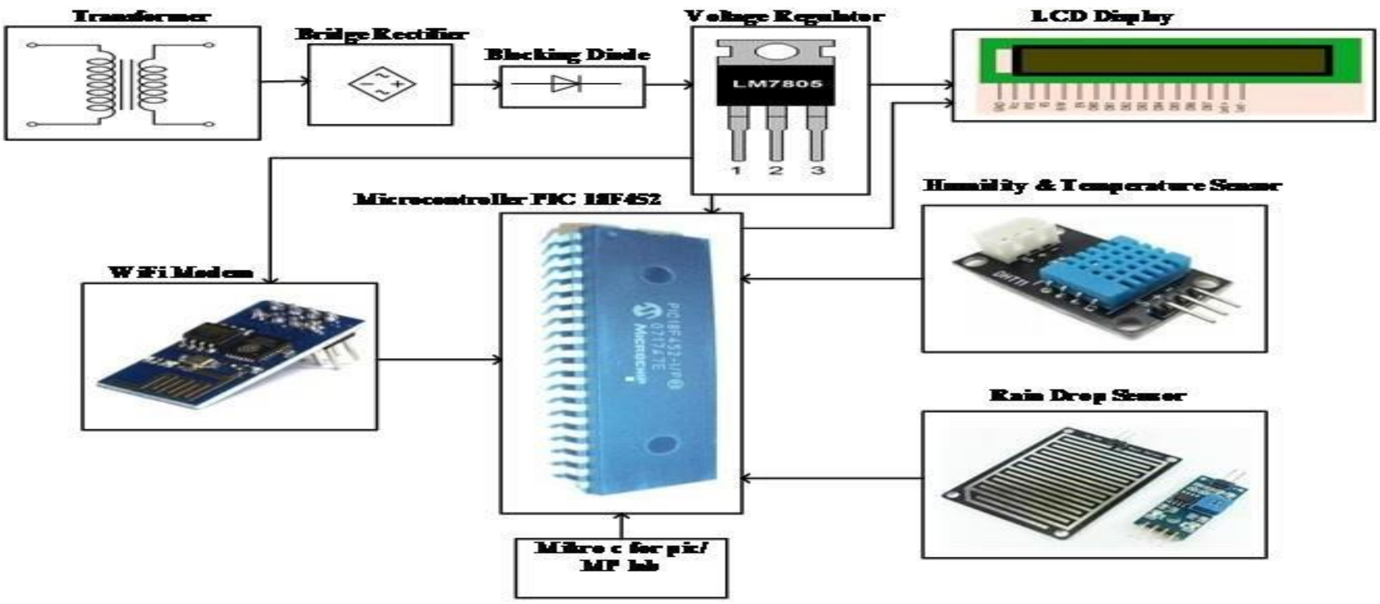
Objective:

The chief purpose of our system is to predict weather to its users based on their climatic history and geographical conditions and provided data. The system will also predict rainfall average and predicts the upcoming weather forecast using machine learning based on Iot

Introduction

Weather conditions around the world change rapidly and continuously. Correct forecasts are essential in today's daily life. From agriculture to industry, from traveling to daily commuting, we are dependent on weather forecasts heavily. As the entire world is suffering from the continuous climate change and its side effects, it is very important to predict the weather without any error to ensure easy and seamless mobility, as well as safe day to day operations. The current weather prediction models heavily depend on complex physical models and need to be run on large computer systems involving hundreds of HPC nodes. The computational power of these large systems is required to solve the models that describe the atmosphere. Despite using these costly and complex devices, there are often inaccurate forecasts because of incorrect initial measurements of the conditions or an incomplete understanding of atmospheric processes. Moreover, it generally takes a long time to solve complex models like these. As weather systems can travel a long way over time in all directions, the weather of one place depends on that of others considerably [10]. In this work, we propose a method to utilize surrounding city's historical weather data along with a particular city's data to predict its weather condition. We combine these data and use it to train simple machine learning models, which in turn, can predict correct weather conditions for the next few days. These simple models can be run on low cost and less resource-intensive computing systems, yet can provide quick and accurate enough forecasts to be used in our day-to-day life. In this work, we present a case study on the city of Nashville in Tennessee, USA, which is known for its fluctuating weather patterns, and show that our simple model can provide reliable weather forecasts for this city

Systems general model



The further information and detail about this IOT Weather Reporting System is available at website
http://microcontrollerslab.com

Existing System

- System uses temperature, humidity as well as rain sensor to monitor weather and provide live reporting of the weather statistics.
- No recommendation of serendipitous items.
- Limited Content Analysis- A tiny disturbance in one layer, even one as tiny as a butterfly flapping its wings, can have a domino effect, affecting the other layers and snowballing into radically different weather patterns

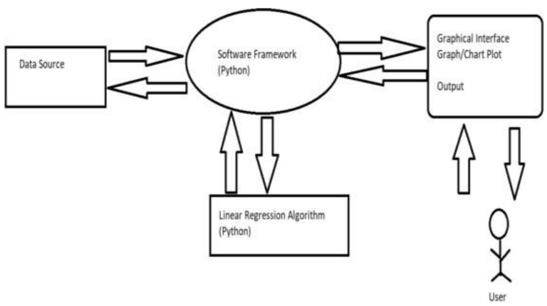
Proposed System

- Our proposed system allows for weather parameter reporting over the internet. It allows the people to directly check the weather stats online without the need of a weather forecasting agency ..... The system constantly monitors temperature using temperature sensor, humidity using humidity sensor and also for rain..

Applications

- The aim of weather monitoring system is **to detect, record and display various weather parameters such as temperature ,humidity**
- This system makes use of sensors for detecting and monitoring weather parameters and then this collected information is sent to the cloud which can be accessed using the internet.

Content based prediction system



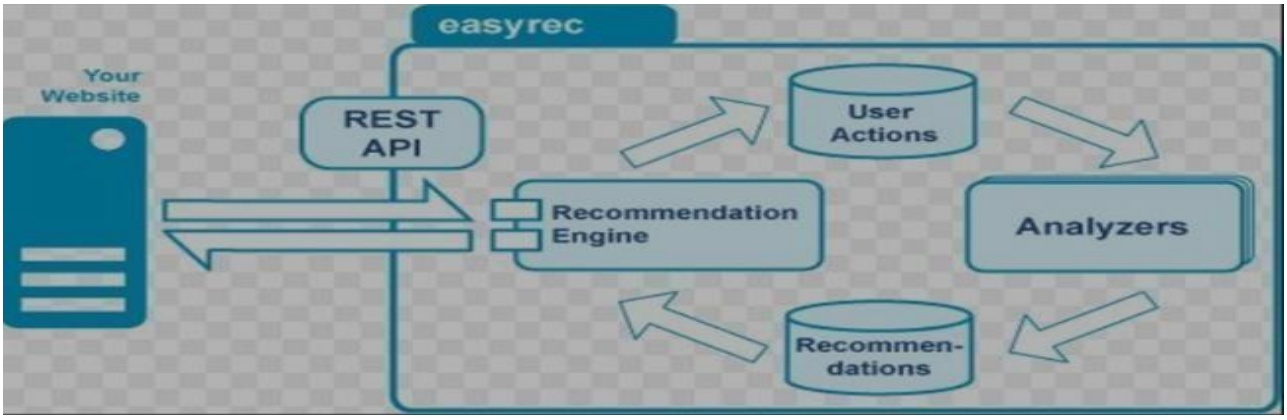
- The system must provide the predicted weather.
- The system must have an easy to use interface for using the system for all the users.
- The Admin must be able to update/modify the Dataset.
- The Dataset of the weather must be available for the system.

DATA COLLECTION

The data of weather forecast was obtained from Kaggle. We took about 4000 trained data and 800 test data. Parameters are :-

- Temperature
- Pressure
- Humidity
- Dewpoint
- Rainfall
- Precipitation

How do weather predictor works?



Here we propose a smart weather reporting system over the internet. Our proposed system allows for weather parameter reporting over the internet. It allows the people to directly check the weather stats online without the need of a weather forecasting agency. System uses temperature, humidity as well as rain sensor to monitor weather and provide live reporting of the weather statistics. The system constantly monitors temperature using temperature sensor, humidity using humidity sensor and also for rain. The system constantly transmits this data to the microcontroller, which now processes this data and keeps on transmitting it to the online web server over a wifi connection. This data is live updated to be viewed on the online server system. Also system allows user to set alerts for particular instances, the system provides alerts to user if the weather parameters cross those values. Thus the IOT based weather reporting system provides an efficient internet based weather reporting system for users.

CHAPTER 2: REQUIREMENTS, FEASIBILITY AND SCOPE/OBJECTIVE

Required Tools:

Hardware Requirements

- Microcontroller.
- ESP8266 based wifi module Nodemcu
- Temperature and Humidity Sensor(DHT11)
- Barometric Pressure Sensor(BMP180)
- LDR.
- Raindrop Module.
- Mobile phone to receive Email and SMS.

Software Requirements

For Developer

- Python (3 or newer)
- NodeJS
- Jupyter Notebook
- MongoDB
- ReactJS
- ExpressJS
- Flask
- Visual Studio Code

For Users

- For Mobile Users: Android Version > 6.0
- For PC Users : Any browser supporting JavaScript.

Feasibility Analysis:

connectivity of sensors with various protocol and various properties of applications for obtaining complete interaction. **Financial:** The proposed project is totally financial independent there is no financial requirement.
Technology: Internet of thing may be defined as a group of physical devices or sensors which connected to a network and have unique identifiers. IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between physical world and computer based system. It is a future technology which connects the entire world. In IOT sensor or things are connected to each other which transfer the data over a network cloud. As per the survey of technological expert's 45-55 Billion thing will be connected in IoT technology by 2022. IoT technology offered wide ranges of connectivity of sensors with various protocol and various properties of applications for obtaining complete interaction.
Operational Feasibility: The project will be implemented in a way that it will allow the functioning of prediction smoothly. It will provide a user-friendly user interface in a modular fashion.

Product/Service Marketplace

The weather forecasting system will impact client institutions in several ways. The following provides a high-level explanation of how the organization, tools, processes, and roles and responsibilities will be affected as a result of the movie recommendation system implementation:-

Tools: The existing requirement for on site management systems will be eliminated completely with the availability of a cloud-based system.

Processes: With the Movie recommendation system comes more efficient and streamlined administrative and customer relations processes.

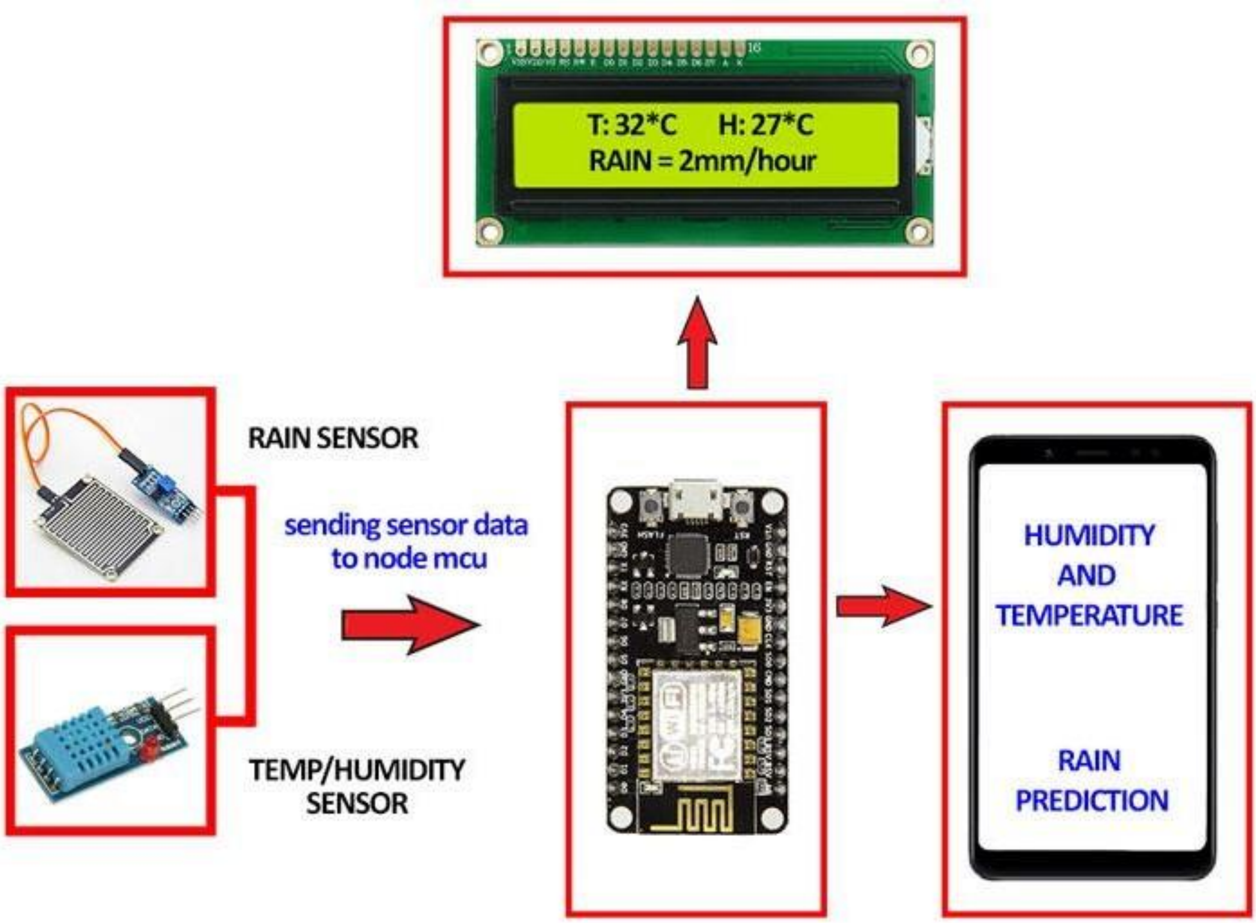
Hardware/Software: Clients will need to handle no extra software or hardware apart from a stable high-speed Internet connection and a computer device.

CHAPTER 5: ANALYSIS, ACTIVITY TIME SCHEDULE (PERT)

Problem Formulation

1 limited way for user to know about weather such as temperature, humidity and pressure

2 user can't be altered of the strong winds, heat waves or any other weather related emergency
5 difficulty in making weather forecasts without data



Activity Time Schedule

Week 1: Scraping data from Kaggle or some other movie repository

movieId	imdb_link	title	imdb_scor	genres	poster
114709	http://ww	Toy Story (	8.3	Animation	https://images-na.ssl-images-amazon.com/images/M/MV5BMDU2ZWJlMjktMTRhMy00ZTA5LWEzNDgtYmNmZTEwZTViZWJkXkEyXkFqcGdeQXVyNDQ2OTk4MzI@._V1_UX182_CR0,0,182,268_AL_.jpg
113497	http://ww	Jumanji (1!	6.9	Action|Ad	https://images-na.ssl-images-amazon.com/images/M/MV5BZTk2ZmUwYmEtNTcwZS00YmMyLWFkYjMtNTRmZDA3YWExMjc2XkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UY268_CR10,0,182,268_AL_.j
113228	http://ww	Grumpier (	6.6	Comedy|R	https://images-na.ssl-images-amazon.com/images/M/MV5BMjQxM2YyNjMtZjUxYy00OGYyLTg0MmQtNGE2YzNjYmUyZTY1XkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.jpg
114885	http://ww	Waiting to	5.7	Comedy|D	https://images-na.ssl-images-amazon.com/images/M/MV5BMTczMTMyMTgyM15BMl5BanBnXkFtZTcwOTc4OTQyMQ@@._V1_UY268_CR4,0,182,268_AL_.jpg
113041	http://ww	Father of t	5.9	Comedy|F	https://images-na.ssl-images-amazon.com/images/M/MV5BOTEyNzg5NjYtNDU4OS00MWYxLWJhMTItYWU4NTkyNDBmM2Y0XkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.j
113277	http://ww	Heat (1995	8.2	Action|Cri	https://images-na.ssl-images-amazon.com/images/M/MV5BNGMwNzUwNjYtZWM5NS00YzMyLWI4NjAtNjM0ZDBiMzE1YWExXkEyXkFqcGdeQXVyNDk3NzU2MTQ@._V1_UX182_CR0,0,182,268_AL_.j
114319	http://ww	Sabrina (1!	6.3	Comedy|D	https://images-na.ssl-images-amazon.com/images/M/MV5BMTA3OTQ2NTk2ODNeQTJeQWpwZ15BbWU4MDQ3NTM4MDMx._V1_UX182_CR0,0,182,268_AL_.jpg
112302	http://ww	Tom and H	5.6	Adventure	https://images-na.ssl-images-amazon.com/images/M/MV5BMTUxNDYzMDY1OV5BMl5BanBnXkFtZTcwNDA2MzYxMQ@@._V1_UY268_CR2,0,182,268_AL_.jpg
114576	http://ww	Sudden De	5.7	Action|Cri	https://images-na.ssl-images-amazon.com/images/M/MV5BN2NjYWE5NjMtODlmZC00MjJhLWFkZTktYTJlZTI4YjVkMGNmXkEyXkFqcGdeQXVyNDc2NjEyMw@@._V1_UY268_CR0,0,182,268_AL_.jpg
113189	http://ww	GoldenEye	7.2	Action|Ad	https://images-na.ssl-images-amazon.com/images/M/MV5BMzk2OTg4MTk1NF5BMl5BanBnXkFtZTcwNjExNTgzNA@@._V1_UX182_CR0,0,182,268_AL_.jpg
112346	http://ww	The Ameri	6.8	Comedy|D	https://images-na.ssl-images-amazon.com/images/M/MV5BMTI5NDU2NDYzOF5BMl5BanBnXkFtZTYwNDk5MDI5._V1_UY268_CR4,0,182,268_AL_.jpg
112896	http://ww	Dracula: D	5.8	Comedy|F	https://images-na.ssl-images-amazon.com/images/M/MV5BZWQ0ZDFmYzMtZGMyMi00NmYxLWE0MGYtYzM2ZGNhMTE1NTczL2ltYWdlL2ltYWdlXkEyXkFqcGdeQXVyMjM5ODMxODc@._V1_UX182_C
112453	http://ww	Balto (199	7.1	Animation	https://images-na.ssl-images-amazon.com/images/M/MV5BMjBhNmFlZjMtMzhlYy00NDBlLWFiMjctMmE0ZjgwOGM2MTNmXkEyXkFqcGdeQXVyNjExODE1MDc@._V1_UX182_CR0,0,182,268_AL_.jpg
113987	http://ww	Nixon (199	7.1	Biography	https://images-na.ssl-images-amazon.com/images/M/MV5BNzBlOWY0ZmEtZjdkYS00ZGU0LWEwN2YtYzBkNDM5ZDBjMmI1XkEyXkFqcGdeQXVyMTAwMzUyOTc@._V1_UX182_CR0,0,182,268_AL_.jpg
112760	http://ww	Cutthroat	5.6	Action|Ad	https://images-na.ssl-images-amazon.com/images/M/MV5BMDg2YTI0YmQtYzgwMi00Zjk4LWJkZjgtYjg0ZDE2ODUzY2RlL2ltYWdlXkEyXkFqcGdeQXVyNjQzNDI3NzY@._V1_UX182_CR0,0,182,268_AL_.jp
112641	http://ww	Casino (19	8.2	Crime|Dra	https://images-na.ssl-images-amazon.com/images/M/MV5BMTcxOWYzNDYtYmM4YS00N2NkLTk0NTAtNjg1ODgwZjAxYzI3XkEyXkFqcGdeQXVyNTA4NzY1MzY@._V1_UX182_CR0,0,182,268_AL_.jpg
114388	http://ww	Sense and	7.7	Drama|Ro	https://images-na.ssl-images-amazon.com/images/M/MV5BNzk1MjU3MDQyMl5BMl5BanBnXkFtZTcwNjc1OTM2MQ@@._V1_UX182_CR0,0,182,268_AL_.jpg
113101	http://ww	Four Roon	6.7	Comedy	https://images-na.ssl-images-amazon.com/images/M/MV5BNDc3Y2YwMjUtYzlkMi00MTljLTg1ZGMtYzUwODljZTI1OTZjXkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.jpg
112281	http://ww	Ace Ventu	6.3	Adventure	https://images-na.ssl-images-amazon.com/images/M/MV5BNGFiYTgxZDctNGI4OS00MWU1LWIwOGUtZmMyNGQxYjVkZjQ3XkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.jpg
113845	http://ww	Money Tra	5.6	Action|Co	https://images-na.ssl-images-amazon.com/images/M/MV5BNDEwNzcyNjkzNl5BMl5BanBnXkFtZTcwNzQyMzYxMQ@@._V1_UY268_CR4,0,182,268_AL_.jpg
113161	http://ww	Get Shorty	6.9	Comedy|C	https://images-na.ssl-images-amazon.com/images/M/MV5BMjAwODYzNDY4Ml5BMl5BanBnXkFtZTcwODkwNTgzNA@@._V1_UX182_CR0,0,182,268_AL_.jpg
112722	http://ww	Copycat (1	6.6	Crime|Dra	https://images-na.ssl-images-amazon.com/images/M/MV5BYWUwNDk2ZDYtNmFkMi00NjE5LWE1M2ItYTRkNTFjZDU3ZDU4L2ltYWdlL2ltYWdlXkEyXkFqcGdeQXVyMTYxNjkxOQ@@._V1_UX182_CR0,0
112401	http://ww	Assassins (	6.3	Action|Cri	https://images-na.ssl-images-amazon.com/images/M/MV5BMGY2OWI5ZjQtYjY0Zi00Y2M4LWEwMmMtOTJhODYxYTExNWZlL2ltYWdlXkEyXkFqcGdeQXVyNTAyODkwOQ@@._V1_UY268_CR3,0,182,26
114168	http://ww	Powder (1!	6.5	Drama|Fa	https://images-na.ssl-images-amazon.com/images/M/MV5BMTM2NDczNjYwMV5BMl5BanBnXkFtZTYwNTI3Mjc4._V1_UX182_CR0,0,182,268_AL_.jpg
113627	http://ww	Leaving La	7.6	Drama|Ro	https://images-na.ssl-images-amazon.com/images/M/MV5BNDg3MDM5NTI0MF5BMl5BanBnXkFtZTcwNDY0NDk0NA@@._V1_UX182_CR0,0,182,268_AL_.jpg
114057	http://ww	Othello (1!	6.9	Drama|Ro	https://images-na.ssl-images-amazon.com/images/M/MV5BMTIxMzA2ODk2NV5BMl5BanBnXkFtZTcwMzQ4ODIyMQ@@._V1_UY268_CR4,0,182,268_AL_.jpg
114011	http://ww	Now and T	6.8	Comedy|D	https://images-na.ssl-images-amazon.com/images/M/MV5BMTM2MDQ1YjUtMGM0NC00NmFlLTljMDktZjJiNWRhMWYxOWYyXkEyXkFqcGdeQXVyNjgzMjI4ODE@._V1_UX182_CR0,0,182,268_AL_.jpg
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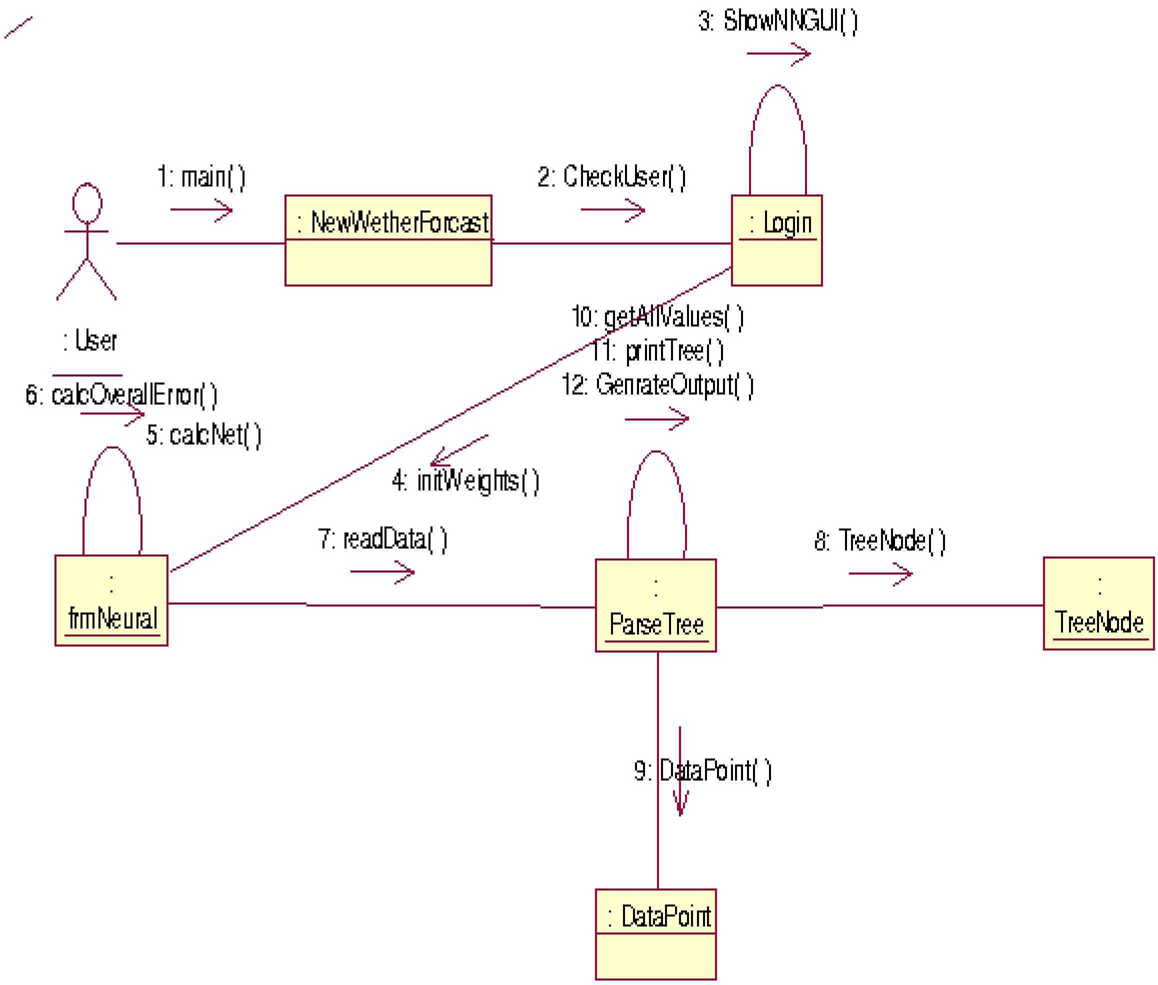
112682	http://ww	The City of	7.7	Fantasy|Sc	https://images-na.ssl-images-amazon.com/images/M/MV5BZGQxZDMwYzYtYmFjNi00NWYyLThjZjAtMDJhODZhYTkyZDNhXkEyXkFqcGdeQXVyNTAyODkwOQ@@._V1_UY268_CR7,0,182,268_AL_.jpg
115012	http://ww	Yao a yao,	7.2	Crime|Dra	https://images-na.ssl-images-amazon.com/images/M/MV5BMTgyMzAwOTQyNF5BMl5BanBnXkFtZTcwNDU1MjgxMQ@@._V1_UY268_CR1,0,182,268_AL_.jpg
112792	http://ww	Dangerous	6.4	Biography	https://images-na.ssl-images-amazon.com/images/M/MV5BZjk2YjNkYTYtOTZkNy00ZmRkLWI5ODEtYzA4MTM3MzMyZjhlXkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.jpg
114746	http://ww	Twelve Mc	8	Mystery|S	https://images-na.ssl-images-amazon.com/images/M/MV5BN2Y2OWU4MWMtNmIyMy00YzMyLWI0Y2ItMTcyZDc3MTdmZDU4XkEyXkFqcGdeQXVyMTQxNzMzNDI@._V1_UX182_CR0,0,182,268_AL_.
114952	http://ww	Wings of C	6.5	Adventure	https://images-na.ssl-images-amazon.com/images/M/MV5BMTc3ODY1MjA3OF5BMl5BanBnXkFtZTcwODgzOTgyMQ@@._V1_UX182_CR0,0,182,268_AL_.jpg

Imagine a situation where scientists/nature analysts want to monitor changes in a particular environment say volcano or a rain-forest. And these people are from different places in the world. In this case, SMS based weather monitoring has its own limitations. Since it sends SMS to few numbers. And time for sending SMS increases as the number of mobile numbers increases. In order to send this data to everyone, a person who receives this SMS can upload/add data to some place where everyone can see it. And what else apart from the Internet connects everyone in this world? However, a person doing it manually is time consuming and tedious job. And then there arises a need of an automated solution for this. So in such scenarios, IOT – Internet of Things proves really effective. Using Internet of Things, we can upload these weather parameters data to the cloud using internet connectivity over a WiFi module through wireless communication. Thus this project is also categorized under Wireless communication projects.

Two things are necessary to view this weather reporting over the Internet. One is the Internet and another is a device to access a URL / website. This device can be laptop or desktop or a tablet or even a smartphone. NOTE that Internet connectivity is required at both places. One where is project is placed and another from where user monitors this data.

Week 5: Making data based forecasting system



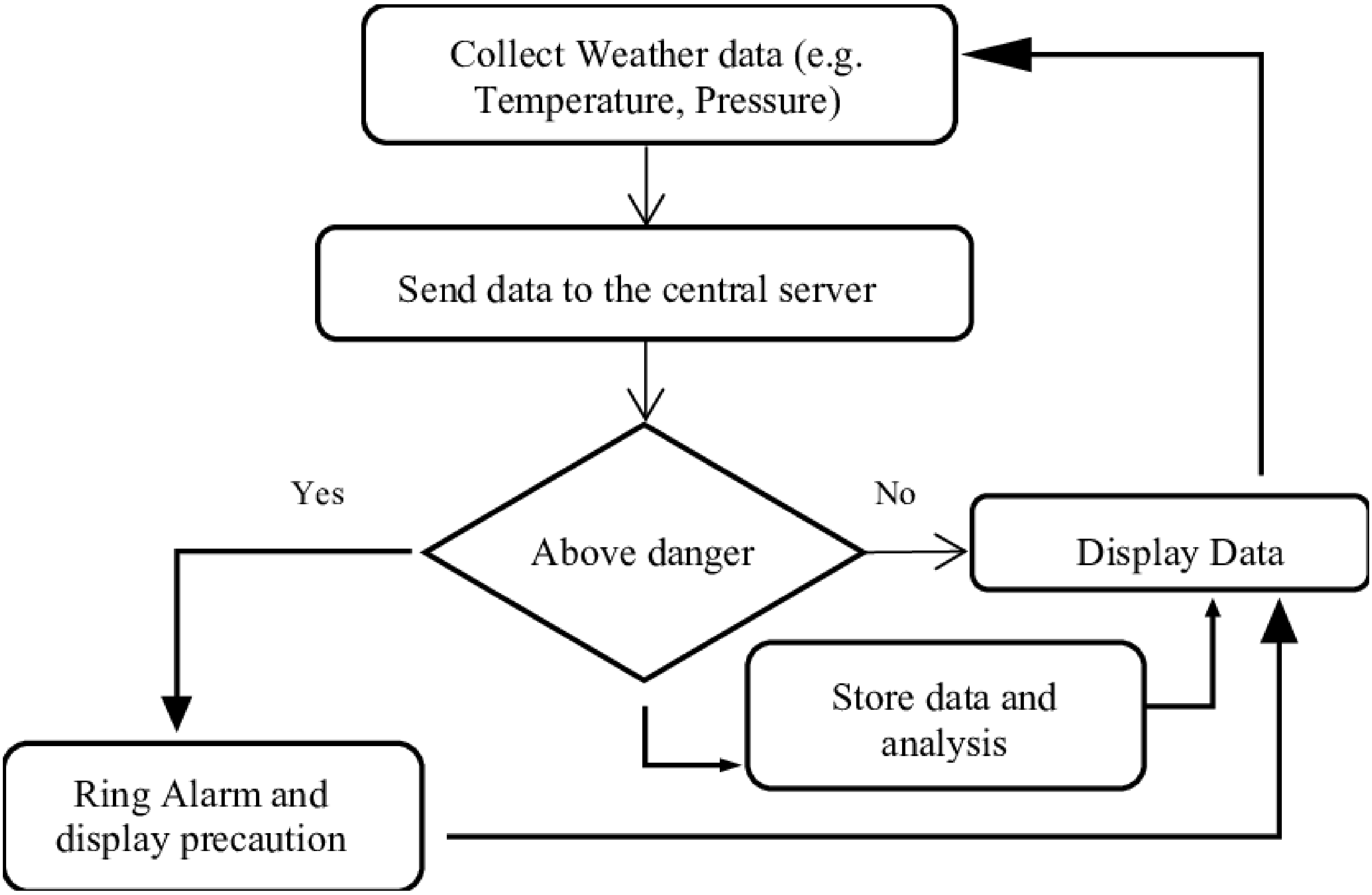
Week 5: Making database and initializing backend server.

Database

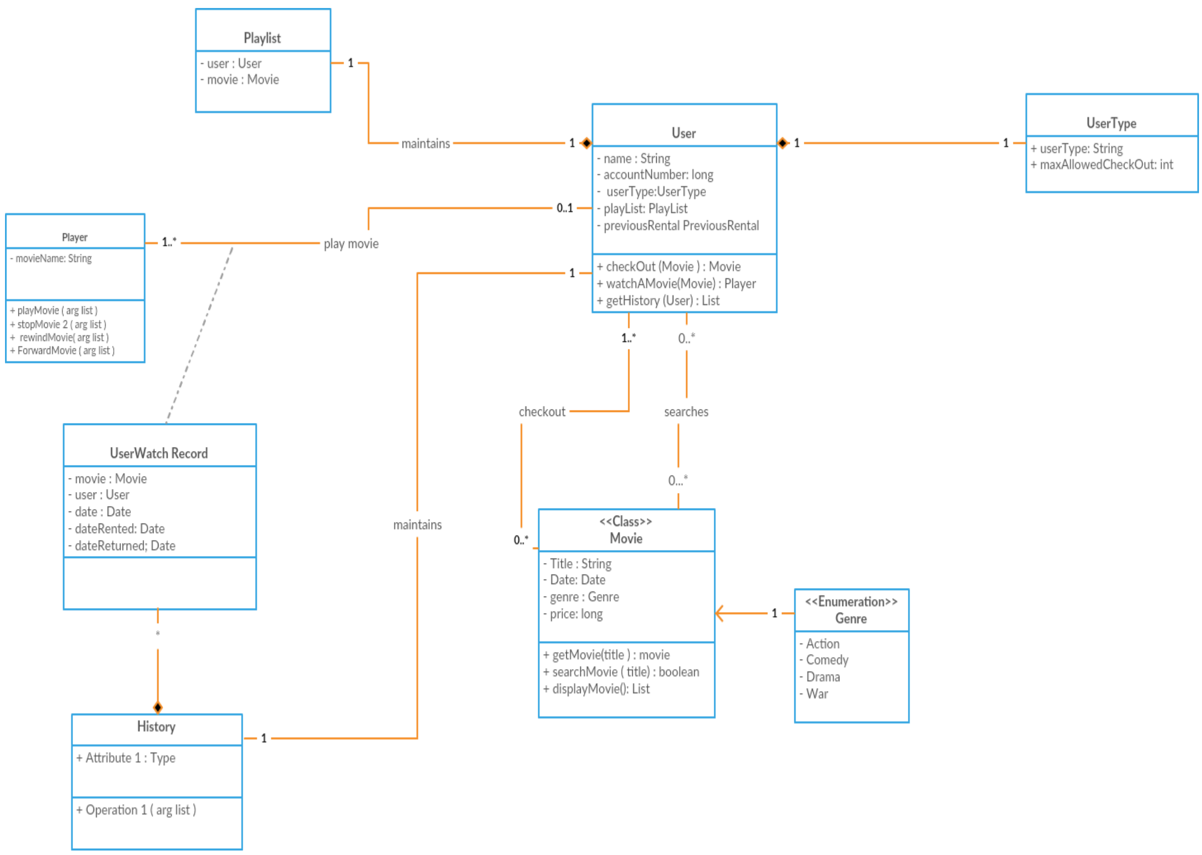
```
connecting to: mongodb://127.0.0.1:27017/?gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("32502ab2-cb72-4619-89c5-04fb55ea54e1") }
MongoDB server version: 4.0.8
Server has startup warnings:
2020-11-07T12:05:46.570+0530 I CONTROL  [initandlisten]
2020-11-07T12:05:46.571+0530 I CONTROL  [initandlisten] ** WARNING: Access control is not enabled for the database.
2020-11-07T12:05:46.571+0530 I CONTROL  [initandlisten] **          Read and write access to data and configuration is u
nrestricted.
2020-11-07T12:05:46.571+0530 I CONTROL  [initandlisten]
---
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---

> use flick
switched to db flick
> show collections
genres_datas
movies_datas
reviews
user_recommendation_datas
users
>
```

CHAPTER 4: DESIGN

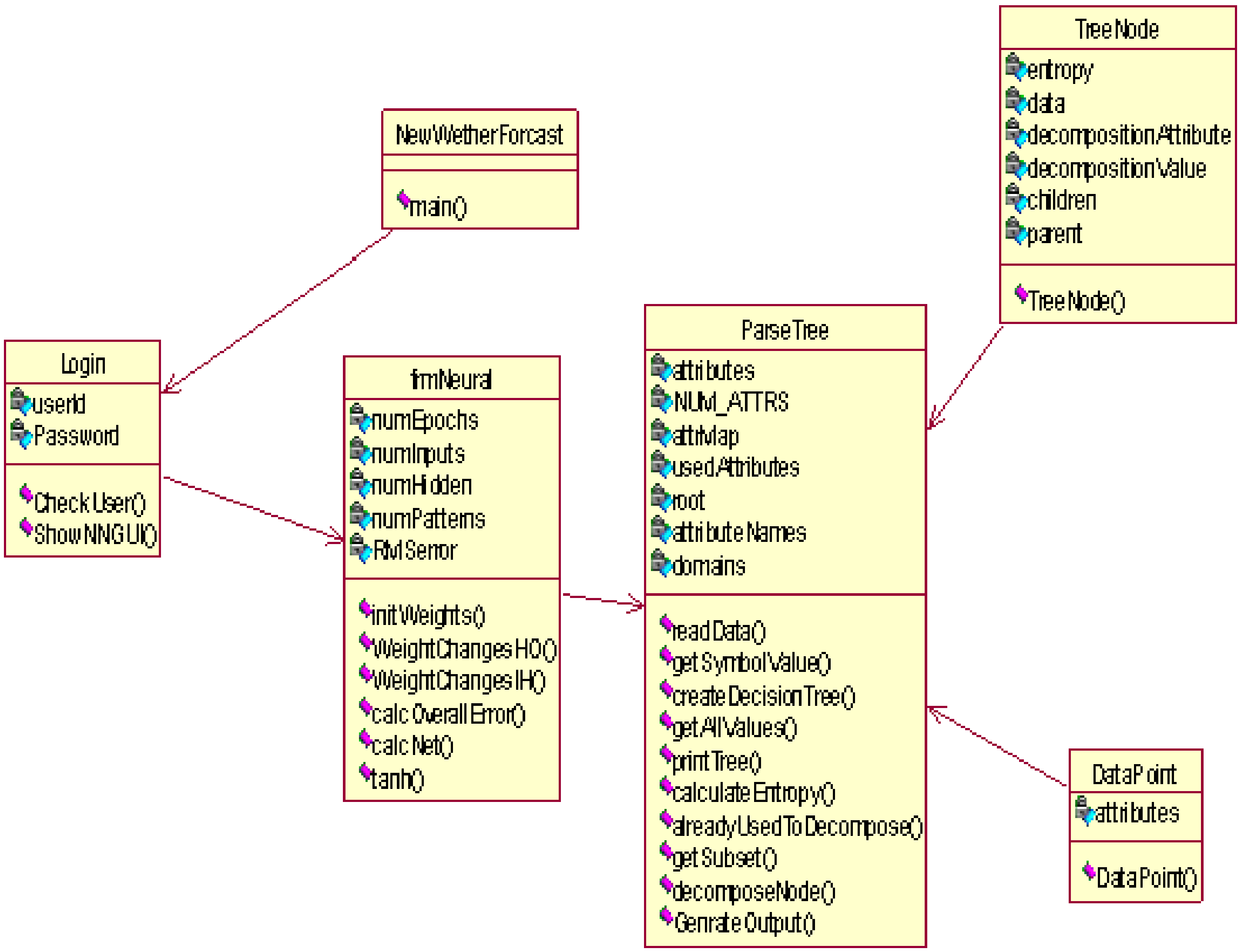
Flow Chart:



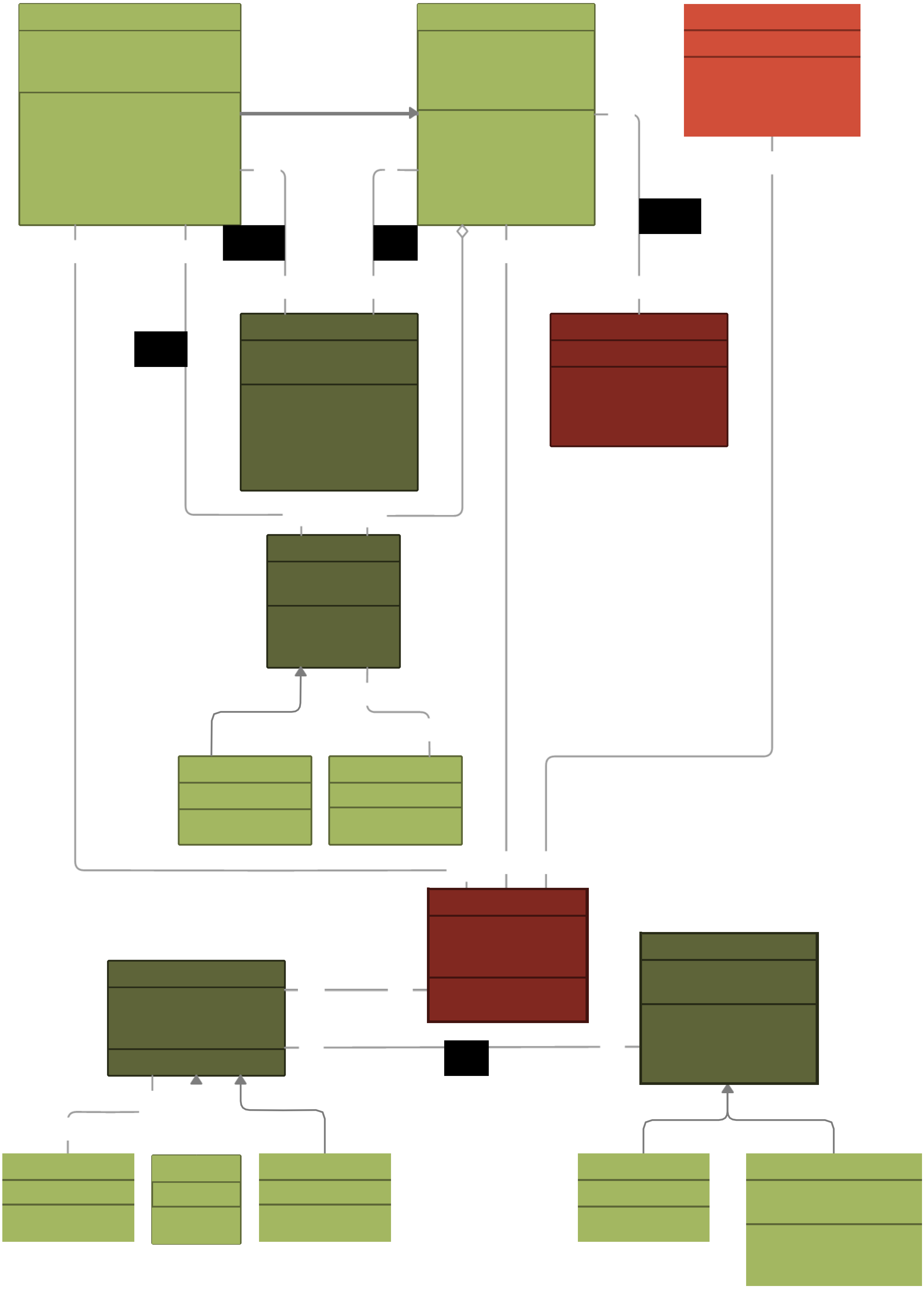
Class Diagram:



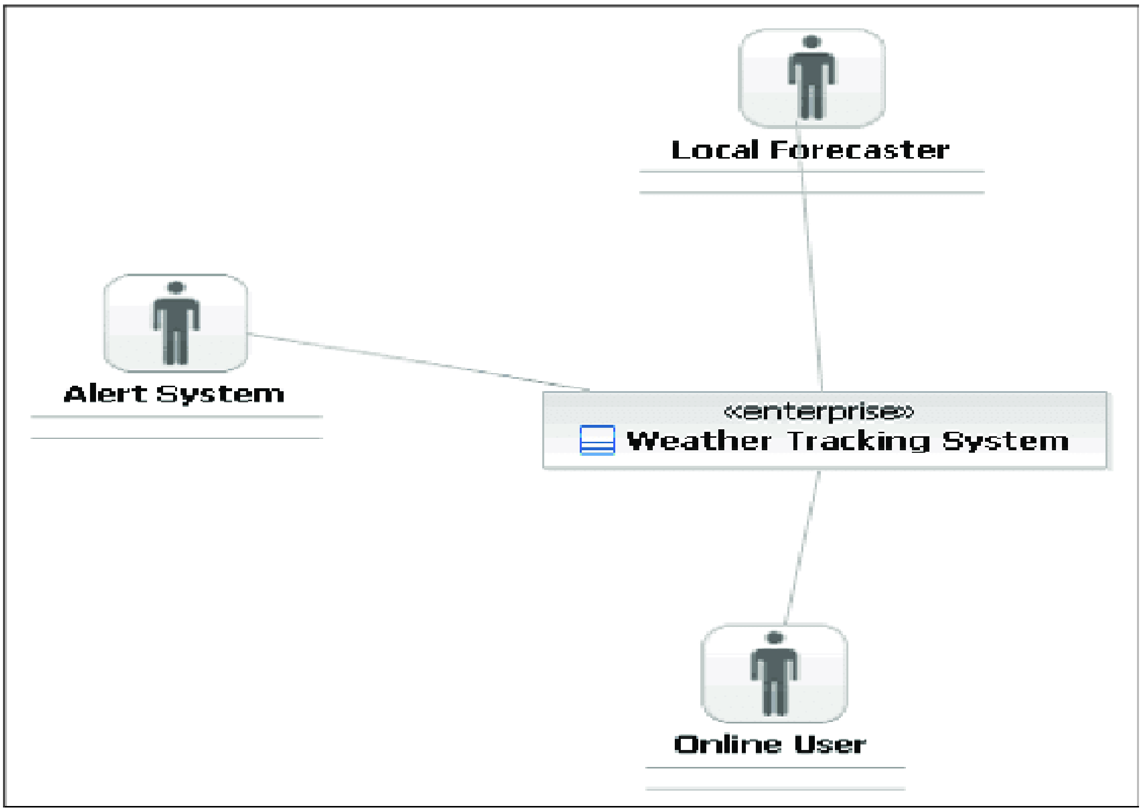
DB-Class-Diagram:



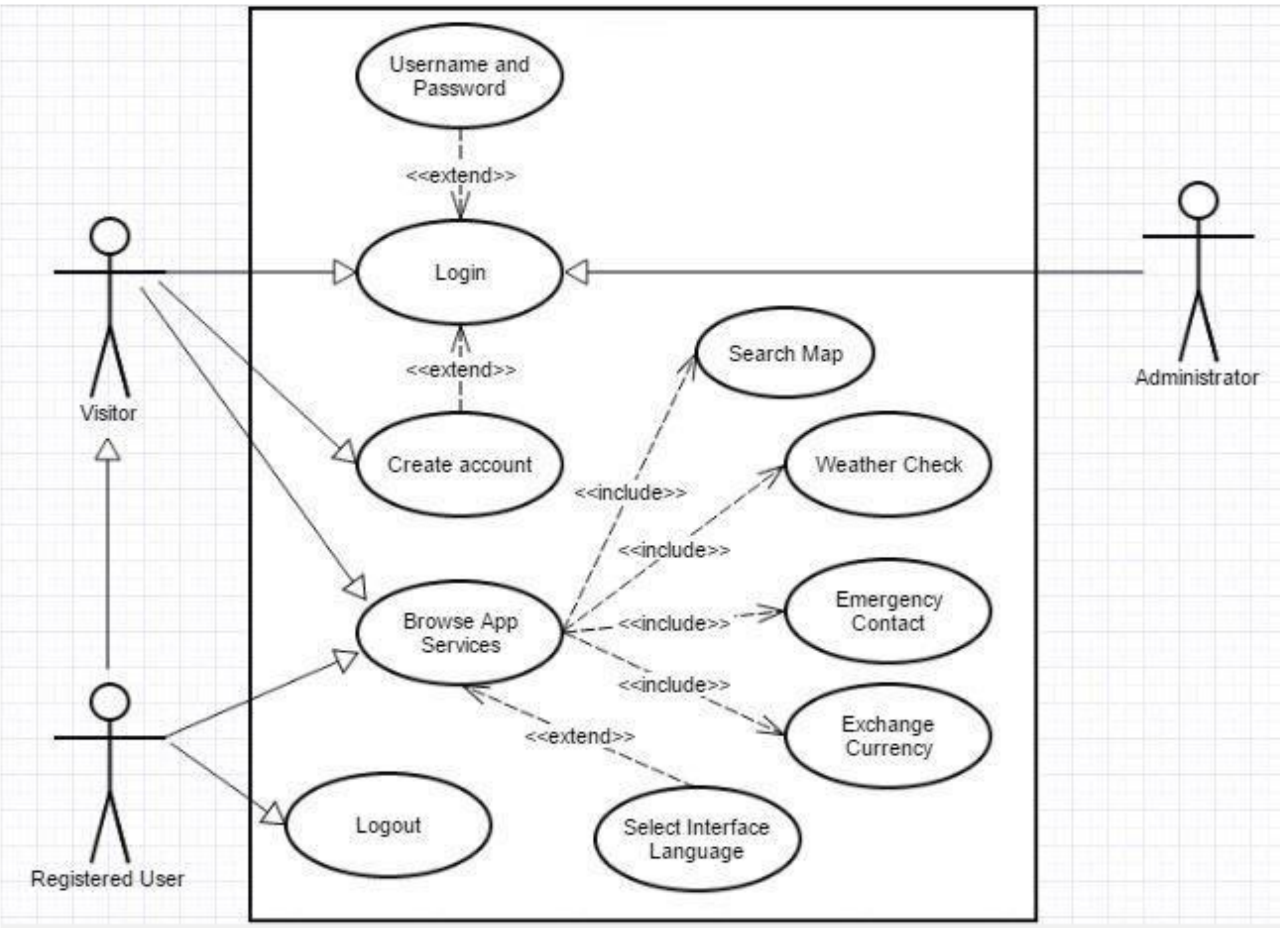
Activity Diagram:



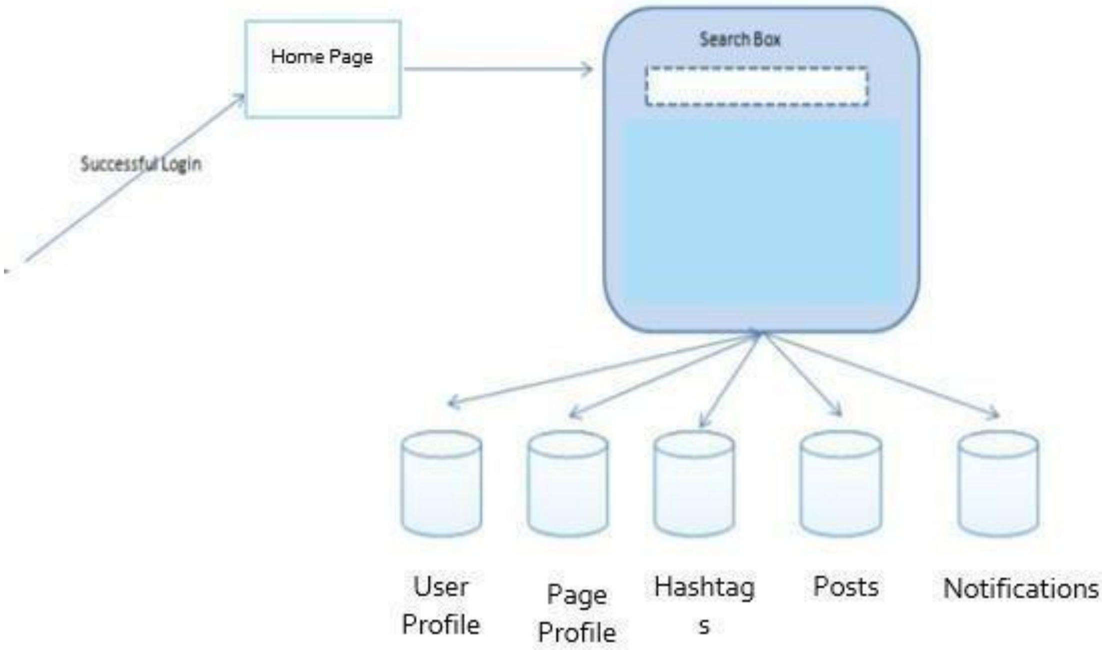
Context Diagram:



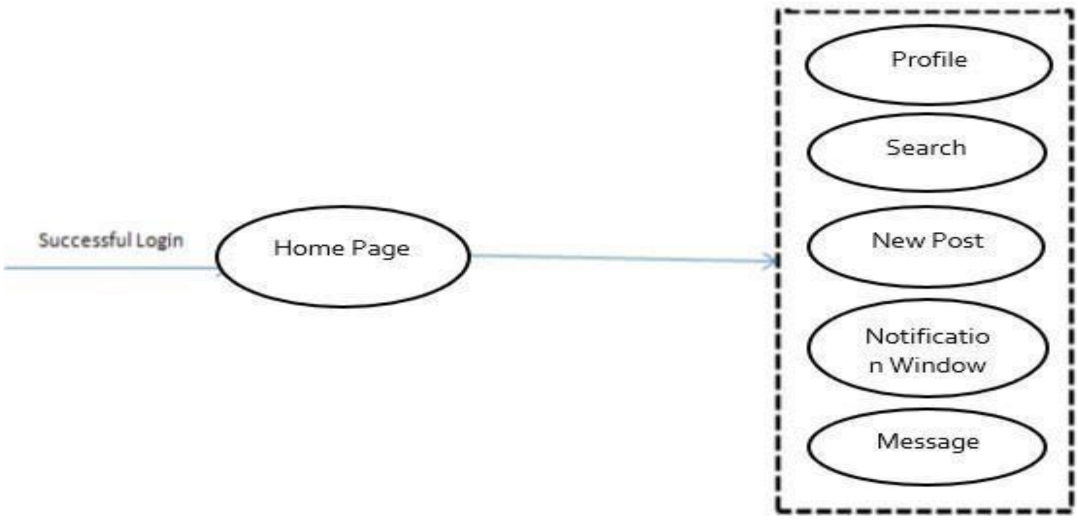
Use Case Diagram:



Search



Common Links



CHAPTER 5. IMPLEMENTATION AND TESTING
PROJECT IMPLEMENTATION

5.1 Algorithms:

Linear Regression:

Module-1 : Data gathering and pre - processing.

Module-2: Applying Algorithm for prediction .

5.2Source Code

```
# importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

# read the data in a pandas dataframe
data = pd.read_csv("C:/Users/TEMP.SANDEEP/Desktop/austin_weather.csv")

#seeing head values
data.head(5)
#seeing shape of the dataset
data.shape

#filling missing NULL values by column means
data.fillna(data.mean())

# drop or delete the unnecessary columns in the data.
data = data.drop(['Events', 'Date', 'SeaLevelPressureHighInches', 'SeaLevelPressureLowInches'],
axis = 1)

# some values have 'T' which denotes trace rainfall
# we need to replace all occurrences of T with 0
# so that we can use the data in our model
```

```
data = data.replace('T', 0.0)

# the data also contains '-' which indicates no
# or NIL. This means that data is not available
# we need to replace these values as well.
data = data.replace('-', 0.0)

# dataframe created with
# the above data array
df = pd.DataFrame(data)

# create histogram for numeric data
df.hist()

# show plot
plt.show()
#basic static

# save the data in a csv file
data.to_csv('C:/Users/TEMP.SANDEEP/Desktop/austin_final_final.csv')

# importing libraries
import pandas as pd
import numpy as np
import sklearn as sk
from sklearn.linear_model import LinearRegression
import matplotlib.pyplot as plt

# read the cleaned data
data = pd.read_csv("C:/Users/TEMP.SANDEEP/Desktop/austin_final_final.csv")
```

```
# the features or the 'x' values of the data
# these columns are used to train the model
# the last column, i.e, precipitation column
# will serve as the label
X = data.drop(['PrecipitationSumInches'], axis = 1)

# the output or the label.
Y = data['PrecipitationSumInches']
# reshaping it into a 2-D vector
Y = Y.values.reshape(-1, 1)

# consider a random day in the dataset
# we shall plot a graph and observe this
# day
day_index = 798
days = [i for i in range(Y.size)]

# initialize a linear regression classifier
clf = LinearRegression()
# train the classifier with our
# input data.
clf.fit(X, Y)

# give a sample input to test our model
# this is a 2-D vector that contains values
# for each column in the dataset.
inp = np.array([[74], [60], [45], [67], [49], [45], [55], [45],
                [57], [29.68], [10], [7], [2], [0], [20], [4], [51]])
inp = inp.reshape(1, -1)

# print the output.
```

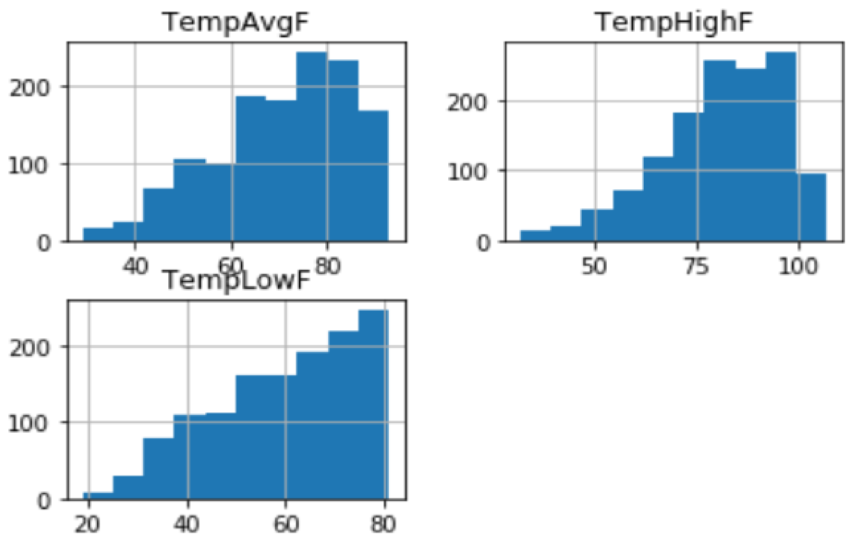
```
print('The precipitation in inches for the input is:', clf.predict(inp))

# plot a graph of the precipitation levels
# versus the total number of days.
# one day, which is in red, is
# tracked here. It has a precipitation
# of approx. 2 inches.
print("the precipitation trend graph: ")
plt.scatter(days, Y, color = 'g')
plt.scatter(days[day_index], Y[day_index], color ='r')
plt.title("Precipitation level")
plt.xlabel("Days")
plt.ylabel("Precipitation in inches")



plt.show()
x_vis = X.filter(['TempAvgF', 'DewPointAvgF', 'HumidityAvgPercent',
                  'SeaLevelPressureAvgInches', 'VisibilityAvgMiles',
                  'WindAvgMPH'], axis = 1)

# plot a graph with a few features (x values)
# against the precipitation or rainfall to observe
# the trends

print("Precipitation vs selected attributes graph: ")

for i in range(x_vis.columns.size):
    plt.subplot(5, 2, i + 1)
    plt.scatter(days, x_vis[x_vis.columns.values[i][:100]],
                                               color = 'g')
```

```
    plt.scatter(days[day_index],
                x_vis[x_vis.columns.values[i]][day_index],
                color ='r')

    plt.title(x_vis.columns.values[i])

plt.show()
```

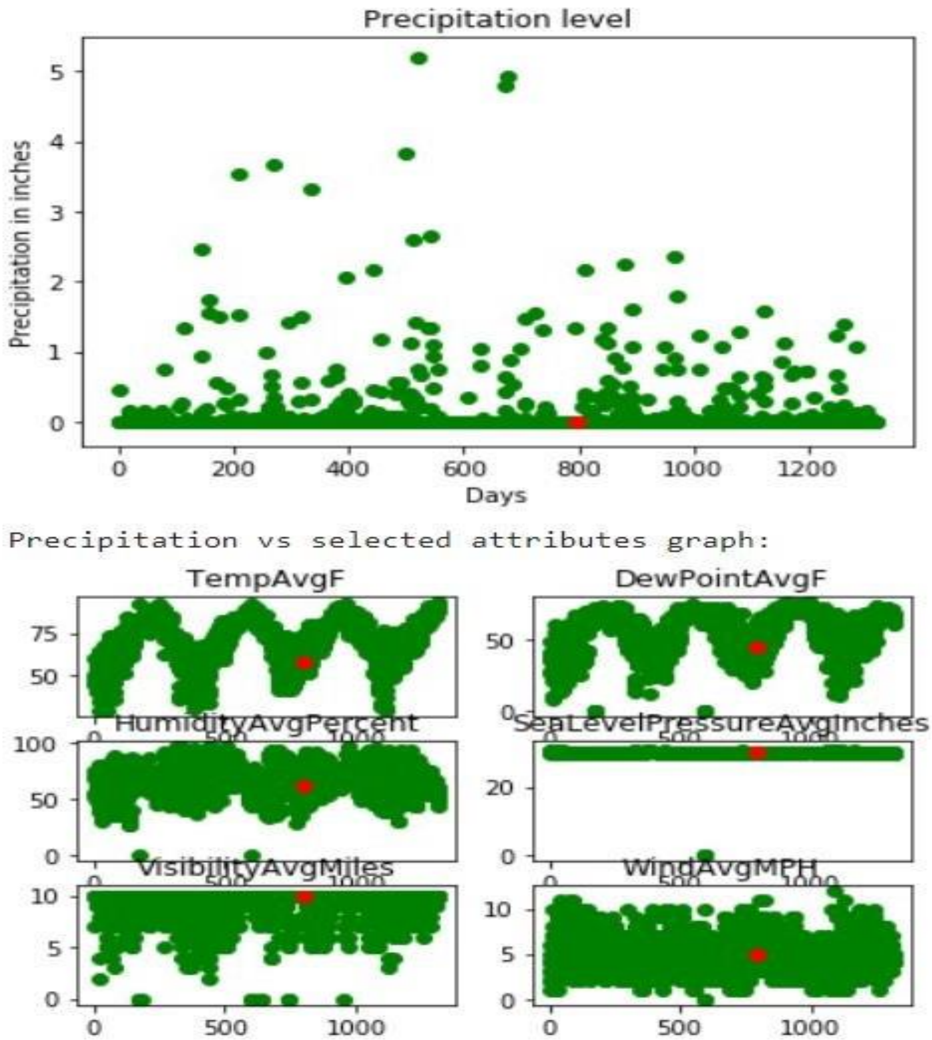
OUTPUT:

The precipitation in inches for the input is: [[1.55868402]]

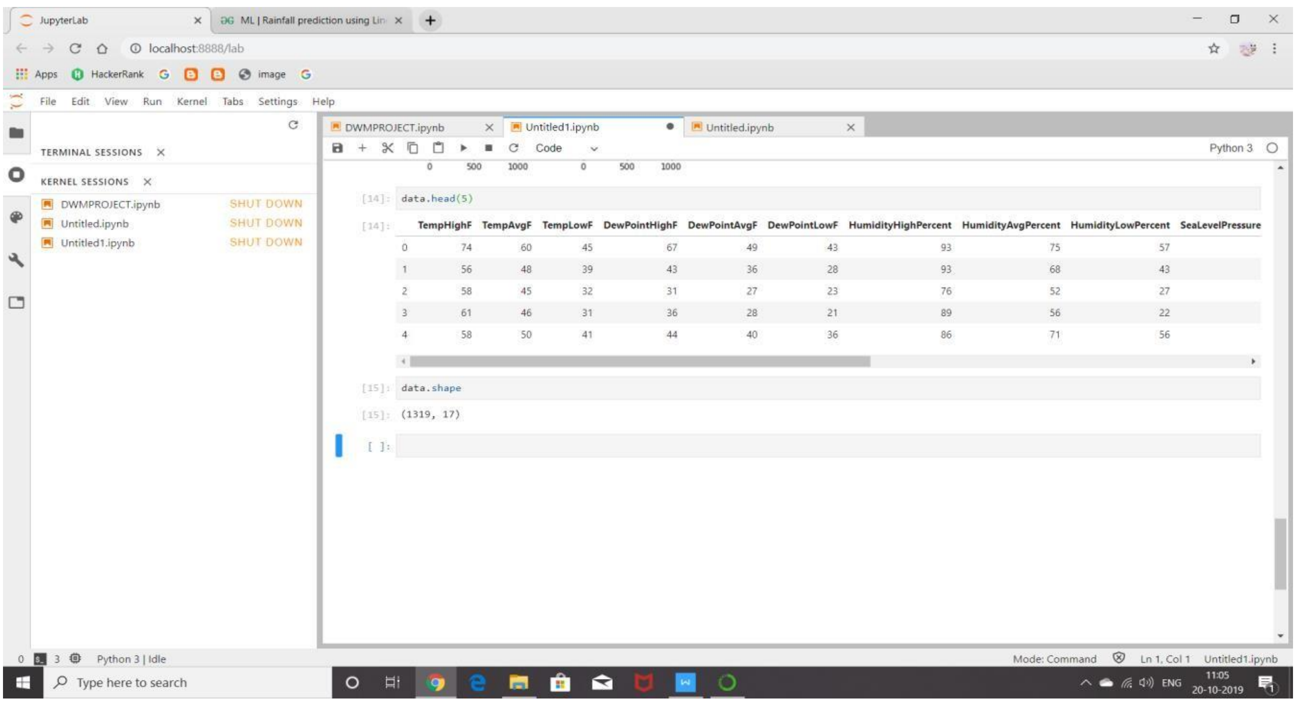
Graphs:



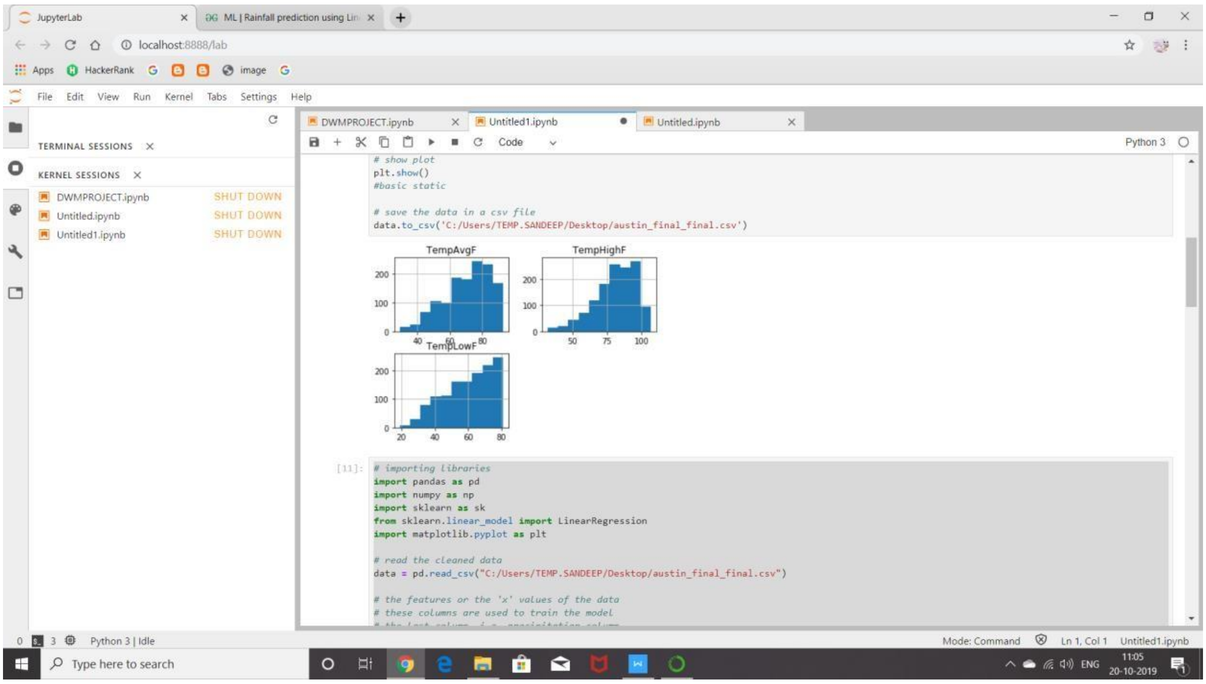
The precipitation trend graph:



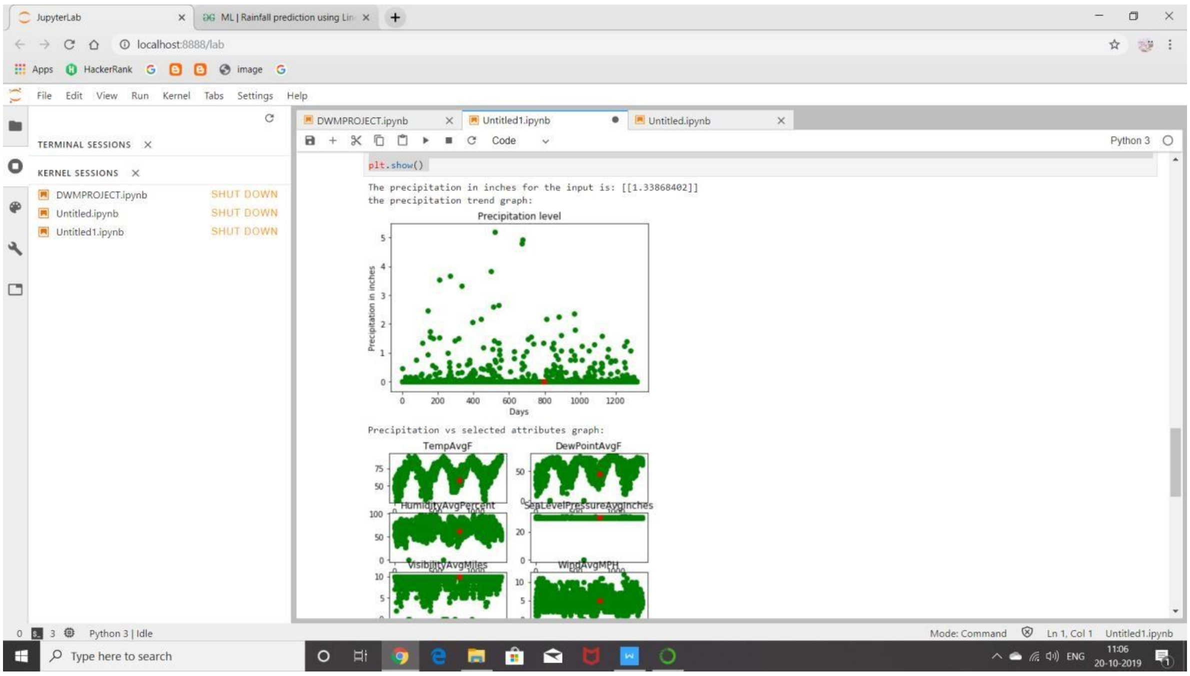
that rainfall can be expected to be high when the temperature is high and humidity is high.



	TempHighF	TempAvgF	TempLowF	DewPointHighF	DewPointAvgF	DewPointLowF	HumidityHighPercent	HumidityAvgPercent	HumidityLowPercent	SeaLevelPressure
0	74	60	45	67	49	43	93	75	57	
1	56	48	39	43	36	28	93	68	43	
2	58	45	32	31	27	23	76	52	27	
3	61	46	31	36	28	21	89	56	22	
4	58	50	41	44	40	36	86	71	56	



# show plot
plt.show()
#basic static
# save the data in a csv file
data.to_csv('C:/Users/TEMP.SANDEEP/Desktop/austin_final_final.csv')
TempAvgF
TempHighF
TempLowF
# importing libraries
import pandas as pd
import numpy as np
import sklearn as sk
from sklearn.linear_model import LinearRegression
import matplotlib.pyplot as plt
# read the cleaned data
data = pd.read_csv("C:/Users/TEMP.SANDEEP/Desktop/austin_final_final.csv")
# the features or the 'x' values of the data
# these columns are used to train the model



plt.show()
The precipitation in inches for the input is: [[1.33868402]]
the precipitation trend graph:
Precipitation level
Precipitation in inches
Days
Precipitation vs selected attributes graph:
TempAvgF
DewPointAvgF
HumidityAvgPercent
SeaLevelPressureAvgInches
VisibilityAvgMiles
WindAvgMPH

CHAPTER 6: LIMITATIONS AND FUTURE SCOPE OF THE PROJECT

Most weather apps on computers and smartphones can only predict the weather 10 days into the future, which is still pretty impressive compared to what meteorologists could do in the past. Today, a forecast for the next five to seven days is just as accurate as a forecast for the next day was 50 years ago.

Still, it doesn't look like we'll get reliable forecasts for a month out in 50 years. Researchers at Pennsylvania State University did a collaborative study with other meteorologists from around the world in which they tried to find the ultimate limit of how far out we could predict the weather, even with the most advanced supercomputers powering the weather models.

TheirÂ research suggested we could add another four to five days of useful results, and probably not get any more. That's because of something called the butterfly effect.

The atmosphere is full of turbulent flows--irregular flows of air that form clouds, power storms, and push around cold fronts--that build on each other and form layers. A tiny disturbance in one layer, even one as tiny as a butterfly flapping its wings, can have a domino effect, affecting the other layers and snowballing into radically different weather patterns. All that variation and uncertainty is why there's a limit to how far out we can meaningfully predict the weather.

CONCLUSION:

We successfully predicted the rainfall using the linear regression but here this is not very accurate only some times any way it depends upon the climate changes to season to season.Here we are taking only summer season weather data set it only useful to predict rainfall in summer season.

REFERENCES :

Textbooks:-

Data Mining: The Textbook 2015 Edition, Kindle Editionby **Charu C. Aggarwal** .

Data Mining: Concepts and TechniquesBy **Jiawei Han, Jian Pei, Micheline Kamber.**

Weblinks:-

1) https://towardsdatascience.com/introduction-to-machine-learning-algorithms-linear-regression-14c4e325882a

2) https://www.kaggle.com/grubenm/austin-weather