Project Report

on

"Markov chain model of Rainfall Probability for Agricultural Planing in Anand"

INNOVATION INFORMATION TRANSFORMATION

Submitted By:

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Er. V. I. Mehra

Sign:_____

Certificate

This report on "Markov chain model of Rainfall Probability for Agricultural Planning in Anand" is a certified

Record

of the project work submitted By

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Acknowledgement

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1. Introduction :

Markov chain model of the Rainfall Probability system provides an easy interface between a user and the Marko chain model. This model used for the yield of crop particularly under rain fed conditions depends on the rainfall pattern. Simple criteria related to sequential phenomena like dry and wet spells could be used for analyzing rainfall data to obtain specific information recognized as a suitable model to explain the long term frequency behavior of wet or dry spells. Several authors have demonstrated its practical utility in agricultural planning for both long and short term periods. This model enables us to determine the probability of occurrence of dry and wet spells during a particular week and also finding the Descriptive Analysis.

1.1 Objectives:

- To create DBMS for Rainfall data of Agro meteorological observatory of Anand.
- To develop tool for Markov Model for wet and dry analysis, Descriptive data analysis and Rainfall data Normal.
- To harness Information Technology to achieve the above objectives.

1.2 Scope:

Web Based Markov Model for wet and dry analysis, tools is the web based system using which Scientist can generate graphs and reports based on the weather data by the observatory for various purpose of their research or Agricultural Planning.

1.3 Methodology:

2. Markov chain Model :

   Markov chain is a probabilistic automaton. The probability distribution of state transitions is typically represented as the Markov chain's *transition matrix.* If the Markov chain has **N** possible states, the matrix will be an **N x N** matrix, such that entry **(I, J)** is the probability of transitioning from state **I** to state **J**. Additionally, the transition matrix must be a **stochastic**

matrix, a matrix whose entries in each row must add up to exactly 1. This makes complete sense, since each row represents its own probability distribution.

A Wet week (or a Dry week) has been defined as one with ≥ 5 mm (≤ 5 mm) of rainfall according to definition proposed by the Indian Meteorological Department. This gives a sequence of wet and dry weeks. Further, under the assumption that the occurrence of a wet or a dry week is influenced only by the weather condition of the previous week, the process of occurrence of wet and dry weeks can be described by a 2- state Markov chain with wet and dry weeks as the two states. The transition probability matrix P, which describes the 2 – state Markov chain model is given by

$$P = \begin{bmatrix} P_{D/D} & P_{D/W} \\ P_{W/D} & P_{W/W} \end{bmatrix},$$

with PD/D+PD/W=1 and PW/D+PW/W=1, where PD/D, PD/W, PW/D and PW/W are the transition probabilities. That is, they are respectively the probabilities of the following conditional events: ED/D: A week is a dry week given that the preceding week was a dry week. EW/D: A week is a wet week given that the preceding week was a dry week. ED/W: A week is a dry week given that the preceding week was a wet week. EW/W: A week is a wet week given that the preceding week was a wet week. Suppose that each week from January to December is classified according to the occurrence of the four events ED/D, ED/W, EW/D and EW/W such that 1st week depends on the 52nd week of December. Then, repeating this process for each year, frequencies of the occurrences of events are counted. Let these observed frequencies be denoted a, b, c and d

for the respective events with a + b = n0 and c + d = n1. The maximum likelihood estimates of the unknown probabilities PD/D, PD/W, PW/D and PW/W i.e., the parameters of the model are obtained as,

$$\hat{P}_{D/D} = p_{D/D} = \frac{a}{n_0}, \qquad \hat{P}_{D/W} = p_{D/W} = \frac{b}{n_0}$$

$$\hat{P}_{W/D} = p_{W/D} = \frac{c}{n_1}, \qquad \hat{P}_{W/W} = p_{W/W} = \frac{d}{n_1}$$

The transition probabilities are conditional probabilities. But, the probability of a dry week (PD) and the probability of wet week (PW) are estimated from the observed frequencies of the conditional events as follows:

$$\hat{P}_D = p_D = \frac{a+c}{n_0+n_1} \text{ and } \hat{P}_W = p_W = \frac{b+d}{n_0+n_1}$$

These unconditional probabilities are also called binomial probabilities treating a wet week as a success and a dry week as a failure.

2. System Requirements:

2.2. Software Configuration:

- Tools or Text Editor : Vs code or Jupyter notebook, SQLite studio
- Browser : Any Latest Updated Browser
- Language: Python
- Database: Sqlit3

2.2. Hardware Configuration (Current):

- Processor : Intel core I3

- RAM : 8 GB
- Hard Disk : 1 TB

2.3. Hardware Configuration (Required Minimum):

- Processors: Intel Atom® processor or Intel® Core™ i3 or higher
- RAM: 1 GB
- Hard Disk: As per User Requirement.

3. Literature Review

3.1. Django:

- **Django** was created in the fall of 2003, when the web programmers at the Lawrence Journal-World newspaper, Adrian Holovaty and Simon Willison, began using Python to build applications. It was released publicly under a BSD license in July 2005. The framework was named after guitarist **Django** Reinhardt.

3.2. Working of Django:

- Django can look complicated at first. Just navigating to a single, simple page can involve code in three or four different files. Django utilizes a design paradigm widely known as "MVC architecture", or rather, a slight Variation they tend to refer to as "MTV". In this the code is split between a Model, a View, and a Controller. Or, in Django's version, a Model, Template, and View. While this isn't going to attempt to be a thorough explanation of this system (The Django Book's first chapter already does a much better job of that than I could ever attempt) it will attempt to walk through a section of our code and explain how it works and how to trace

your way through the process that renders a webpage when you navigate to a URL.

3.3 The Django Framework:

- Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It's free and open source.

3.4. Advantages of Django Framework :

- **Fast:** This has been designed in a way to help the developers make an application as fast as possible. From idea, production to release, Django helps in making it both cost effective and efficient. Thus it becomes an ideal solution for developers having a primary focus on deadlines.

- **Fully Loaded:** It works in a way that includes dozens of extras to help with user authentication, site maps, content administration, RSS feeds and much more such things. These aspects help in carrying out the web development process completely.
- **Secure:** When you are doing it in Django, it is ensured that developers don't commit any mistakes related to security. Some of the common mistakes include SQL injection, cross-site request forgery, click jacking and cross-site scripting. To manage effectively usernames and passwords, the user authentication system is the key.

- **Scalable:** To meet the heaviest traffic demand, the benefits of Django framework can be seen. Therefore, the busiest sites use this medium to quickly meet the traffic demands.

3.5. Dis-advantages of Django Framework:

- Uses routing pattern specify its URL.
- Django is too monolithic.
- Everything is based on Django ORM.
- Components get deployed together.
- Knowledge of full system is required to work.

3.6. Programming language

- Python

3.7. Server and Client Technology

- Wsgi(Web Server Gateway Interface) server.
- Also run on Apache, Gunicorn, Nginx servers.

3.8. Development Environment

- Visual Studio Code (IDE) in my Project.
- Support any text editor.

3.9. Description of tools used

- Working with Python in Visual Studio Code, using the Microsoft Python extension, is simple, fun, and productive.
- The extension makes VS Code an excellent IDE, and works on any operating system with a variety of Python interpreters.
- It leverages all of VS Code's power to provide auto complete and IntelliSense, linting, debugging, and unit testing, along with the ability

to easily switch between Python environments, including virtual and conda environments.

3.10. Features of Visual Studio Code

1. Intelligence

IntelliSense is code **auto-complete meets artificial intelligence**. This utility provides a list of suggestions along with a short hint or description as we are writing codes. These are **derived from several contextual factors** such as the programming language, the syntax, the variables, the functions as well as all the codes within the file.

IntelliSense supports a number of programming language out-of-the-box, including Sass, LESS, JavaScript, Typescript, and PHP. Some extensions to include IntelliSense for other programming languages are also available. It is a great feature to improve productivity.

2. Peek

While coding, you may often forget a particular function, where the function is initially defined, and what the required parameters are.

With **Peek**, you can select a function then hit Shift + F12. The selection **expands into an inline window showing the complete definition of the function** as well as where the function is defined. The feature currently works in C, C#, JavaScript, Typescript, .NET, and a few other programming languages.

3. CLI

Similar to Sublime Text with its sub command line, Visual Studio Code is equipped a CLI named code and it is easy to install.

In Windows, the CLI will have already been installed along with the app. The CLI is accessible through the Command Prompt. In OS X, it can be installed and uninstalled through the Command Palette.

You can use the CLI to open a particular directory to Visual Studio Code, or open your current project directory in Terminal or Command Prompt directly from the editor.

4. Built-in Git

Visual Studio Code has Git built right in the editor. On the left of the sidebar, you will find the Git icon where you can initialize Git as well as **perform several Git commands** such as *commit*, *pull*, *push*, *rebase*, *publish*, and look into the changes within the file.

In addition, if you are making changes on a Git repository, the Visual Studio will **show color indicators in the code editor gutter**, indicating where you have made the modifications.

5. Task Runner

Last but not least, Visual Studio Code also has a built-in Task Runner, which provides some level of convenience.

To use this feature, we can either set a tasks.json file or through some popular Task configuration like Grunt, Gulp, or MSBuild if provided. Once the configuration is set, we can run the Task Runner through the Command Palette by typing **Run Task**. Typing **Tasks** will list all related commands.

3.11. Designing Documentation

- Twitter Bootstrap is the most popular front end frameworks currently. It is sleek, intuitive, and powerful mobile first front-end framework for faster and easier web development. It uses HTML, CSS and JavaScript.
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media.

3.12 JavaScript Documentation

- JavaScript is a programming language that lets you supercharge your HTML with animation, interactivity, and dynamic visual effects. JavaScript can make web pages more useful by supplying immediate feedback. For example, a JavaScript-powered automatic calculation can instantly display a total cost, with tax and estimated cost. JavaScript can produce an error message immediately after someone attempts to submit a web form that's missing necessary information.

4. Module List:

4.1. Admin Module

- In This Module Admin can Upload Data and Insert, update, and Delete also.
- Admin can show the log of All Users and User Account Activation.

4.2. User Module

- In This Module Users can Registration after Activated by Admin.
- Users can Analysis of Markov chain Analysis and Descriptive Analysis.
- User can Change the Password of own Account.

5. Testing:

5.1 Unit Testing

1. Objective

- The objective of Unit Testing is to test a unit of code (program or set of programs) using the Unit Test Specifications, after coding is completed. Unit testing tests the minimal software component, or module.

- Each unit of the software is tested to verify that the detailed design for the unit has been correctly implemented. In an object-oriented environment this is usually at the class level, and the minimal tests include the constructors and the destructors.
- Since the testing will depend on the completeness and correctness of test specifications, it is important to subject these to quality and verification reviews

2. Input

- Unit Test Specifications
- Code to be tested

3. Testing Process

- Checking for availability of Code Walk-through reports which have documented the existence of and conformance to coding standards.
- Review of Unit Test Specifications.
- Verify the Unit Test Specifications conform to the program specifications.
- Verify that all boundary and null data conditions are included.

4. Following are some of the test cases that are given below:

- Registration Form Validations Testing.
    - Text Field.
    - Number Field.
    - Email Field.
    - Password Field.
    - Regular Expression Validation for each Fields.
- Module Testing
    - Admin
    - Users

5.1. Test cases

1)Login :

Project Name: Markov chain model of Rainfall Probability for Agricultural Planning in Anand	
Test Case	
Test Case Id: test-1	**Test Designed by:** Rupesh Patel
Test Priority (Low/Medium/High): Medium	**Test Designed date:** 23-7-2019
Module Name: Login	**Test Executed by:** -- Rupesh Patel
Test Title: verify login with valid Username and password	**Test Execution date:** 23-7-2019
Description: User Login	
Pre-conditions: User should login with registered and valid credentials	

Dependencies:

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Neviget to Login Page	User Name: Rupesh7399@gmail.com, Password:Rupesh@123	User should be able to logi And Redirect home page.	User will be navigate on home page and user will see various other option in menu bar like Analysis ,change Password profile..	Pass	
2	Provide valid Username					
3	Provide valid Password					
4	Click Login Button					
5	Forget Password	Enter registered email id in valid format	User should get OTP via email id	User get Mail.		
Post-conditions: User is validated with database and successfully login to account.						

2) Registration

Project Name: Markov chain model of Rainfall Probability for Agricultural Planning in Anand	
Test Case	
Test Case Id: test-2	**Test Designed by:** Rupesh Patel
Test Priority (Low/Medium/High): Medium	**Test Designed date:** 20-7-2019
Module Name: Registration	**Test Executed by:** -- Rupesh Patel
Test Title: check whether all validation regarding details work properly or not	**Test Execution date:** 21-7-2019
Description: : Registration form	
Pre-conditions: User will have to enter all details in valid format	
Dependencies: All data should be insert success fully in database table	

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Click on register	User Name: Rupesh Password:Rupesh@123 Email id: rupesh@gmail.com Conform Password: Rupesh@123 First name: Rupesh Last name : Patel	User will successfully register	User will successfully Register	Pass	
2	Enter details					
3	Click on register button					
5	Email and User Name is already registered	If I fill all details and enter same email id and Username	Give error of email and User already exist	Popup error of email id and Username already exist		
Post-conditions: -Nil-						

3) Insert Data in Weather data table

Project Name: Markov chain model of Rainfall Probability for Agricultural Planning in Anand	
Test Case	
Test Case Id: test-3	**Test Designed by:** Rupesh Patel
Test Priority (Low/Medium/High): Medium	**Test Designed date:** 28-8-2019
Module Name: Insert Data	**Test Executed by:** -- Rupesh Patel
Test Title: check whether all validation regarding details work properly or not and properly insert data or not	**Test Execution date:** 29-8-2019
Description: Import data in data table	
Pre-conditions: Data file is selected valid or not	

Dependencies: All data should be insert success fully in database table

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Click import	Data.csv	Import successfully	Import successfully	Pass	
2	Selected file format valid or not	fill File Format is csv				
Post-conditions: -Nil-						

4) Descriptive Analysis

Project Name: Markov chain model of Rainfall Probability for Agricultural Planning in Anand	
Test Case	
Test Case Id: test-4	**Test Designed by:** Rupesh Patel
Test Priority (Low/Medium/High): Medium	**Test Designed date:** 17-10-2019
Module Name: Descriptive Analysis	**Test Executed by:** -- Rupesh Patel
Test Title: Check the Calculation of Descriptive Analysis	**Test Execution date:** 18-10-2019
Description: selected date between minimum 2 days	
Pre-conditions: Start date and End date is selected valid or not	

Dependencies: All data calculation is check Properly

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Click Analysis	Start Date:01-01-1989 End Date:31-12-1989	Calculation of mean = 1.94 Std Error=0.42 Std. Deviation = 8.0 Variance=64.01 Skewness = 5.78	Calculation of mean = 1.94 Std Error=0.42 Std. Deviation = 8.0 Variance=64.01 Skewness = 5.78	Pass	
Post-conditions: -Nil-						

5) Markov chain Analysis

Project Name: Markov chain model of Rainfall Probability for Agricultural Planning in Anand	
Test Case	
Test Case Id: test-5	**Test Designed by:** Rupesh Patel
Test Priority (Low/Medium/High): Medium	**Test Designed date:** 30-09-2019
Module Name: Markov chain Analysis	**Test Executed by:** -- Rupesh Patel
Test Title: Check the data of Markov chain Analysis	**Test Execution date:** 01-10-2019
Description: selected date between minimum 4 years	
Pre-conditions: Start date and End date is selected valid or not	

Dependencies: All data calculation is check Properly

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Click Analysis	Start Date:01-01-1989 End Date:31-12-1989	Print Chart of Marko chain Analysis and probability Table	Print Chart of Marko chain Analysis and probability Table	Pass	
Post-conditions: -Nil-						

5.2. Integration Testing

- Integration testing exposes defects in the interfaces and interaction between integrated components (modules). Progressively larger groups of tested software components corresponding to elements of architectural design are integrated and tested until the software works as a system.
- As Modular coding strategy was used, after completion of my module and integrating the module with the complete application, time was given to me to test their part of module completely and thoroughly.
- Integration testing takes as its input, modules that have been checked out by unit testing, groups them in larger aggregates, applies tests defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing.

Following are some of the test cases that are given below:

1. Verify that communication between the systems are done correctly
2. Understand how the data is transferred from one module to another.
3. Is record fetch automatically from one module to another?

5.3. System Testing

- System Testing (ST) is a black box testing technique performed to evaluate the complete system the system's compliance against specified requirements. In System testing, the functionalities of the system are tested from an end-to-end perspective.
- System Testing is usually carried out by a team that is independent of the development team in order to measure the quality of the system unbiased. It includes both functional and Non-Functional testing.

5.4. System Integration Testing

- System Integration Testing is defined as a type of software testing carried out in an integrated hardware and software environment to verify the behavior of the complete system. It is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirement.
- System Integration Testing (SIT) is performed to verify the interactions between the modules of a software system. It deals with the verification of the high and low-level software requirements specified in the Software Requirements Specification/Data and the Software Design Document.
- It also verifies a software system's coexistence with others and tests the interface between modules of the software application. In this type of testing, modules are first tested individually and then combined to make a system.
- For Example, software and/or hardware components are combined and tested progressively until the entire system has been integrated

6. Data Dictionary:

6.1. User Table

Data Element	Alias	Data Type	Null able	Constrain	Description
User id	U_id	Int	Not Null	PK	The unique identification key for User
First Name	F_name	Varchar(50)	NotNull	-	The field for first name
Last Name	L_name	Varchar(50)	NotNull	-	The field for last name
Supper User	Is_supper	Bool	Notnull,default:0	-	The field for Admin user
Email	Email	Varchar(50)	NotNull	-	The field for user Email id
Activite	Is_active	Bool	NotNull default:0	-	This field for user Activation
Password	Pass	Varchar(20)	NotNull	-	This field for Password
Institute id	I_id	Int	Notnull	FK	This is Institute identification key

6.2. Institute Table

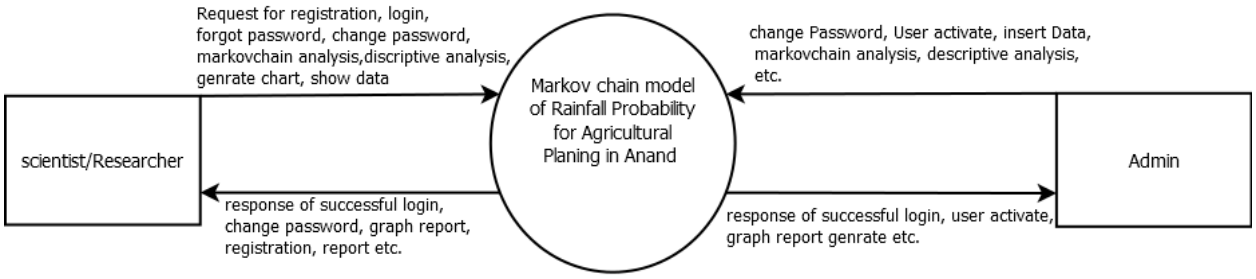
Data Element	Alias	Data Type	Null able	Constrain	Description
Instituted id	I_id	Int	Not Null	PK	The unique identification key for Instituted
Instituted name	Name	Varchar(20)	Not null	-	This field for instituted Name

6.3. Weather Table

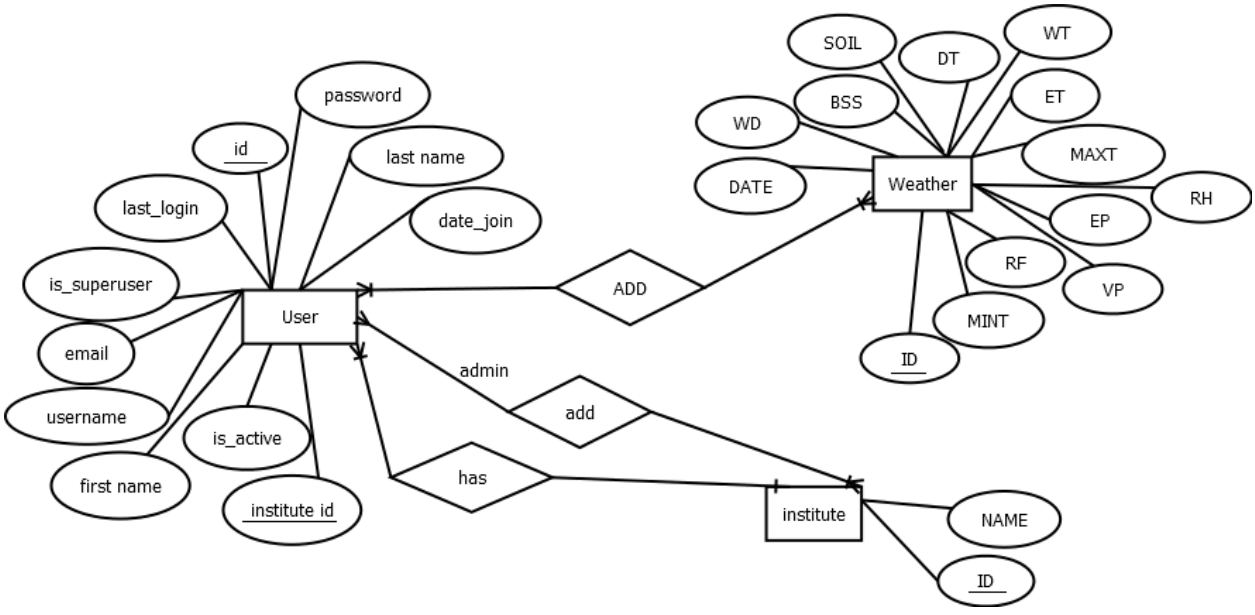
Data Element	Alias	Data Type	Null able	Constrain	Description
Data id	D_id	Int	Not Null	PK	The unique identification key for Weather Data
Date	Date	Date&time	Not null	-	This field use for Daily data
EP	Ep	Float(5,2)	Not null	-	This field use for Evaporation
ET	Et	Float(5,2)	Not null	-	This field use for Evapo-Transpiration
Bss	Bss	Float(5,2)	Not null	-	This field use for Sunshine hour
Ws	Ws	Float(5,2)	Not null	-	This field use for Wind speed
Wd	Wd	Float(5,2)	Not null	-	This field use for Wind direction
RF	Rf	Float(5,2)	Not null	-	This field use for Rain fall
RH	Rh	Float(5,2)	Not null	-	This field use for Relative Humidity
MaxTEMP	Maxt	Float(5,2)	Not null	-	This field use for Maximum temperature
MINT	Mint	Float(5,2)	Not null	-	This field use for Mean temperature

7. System Diagrams

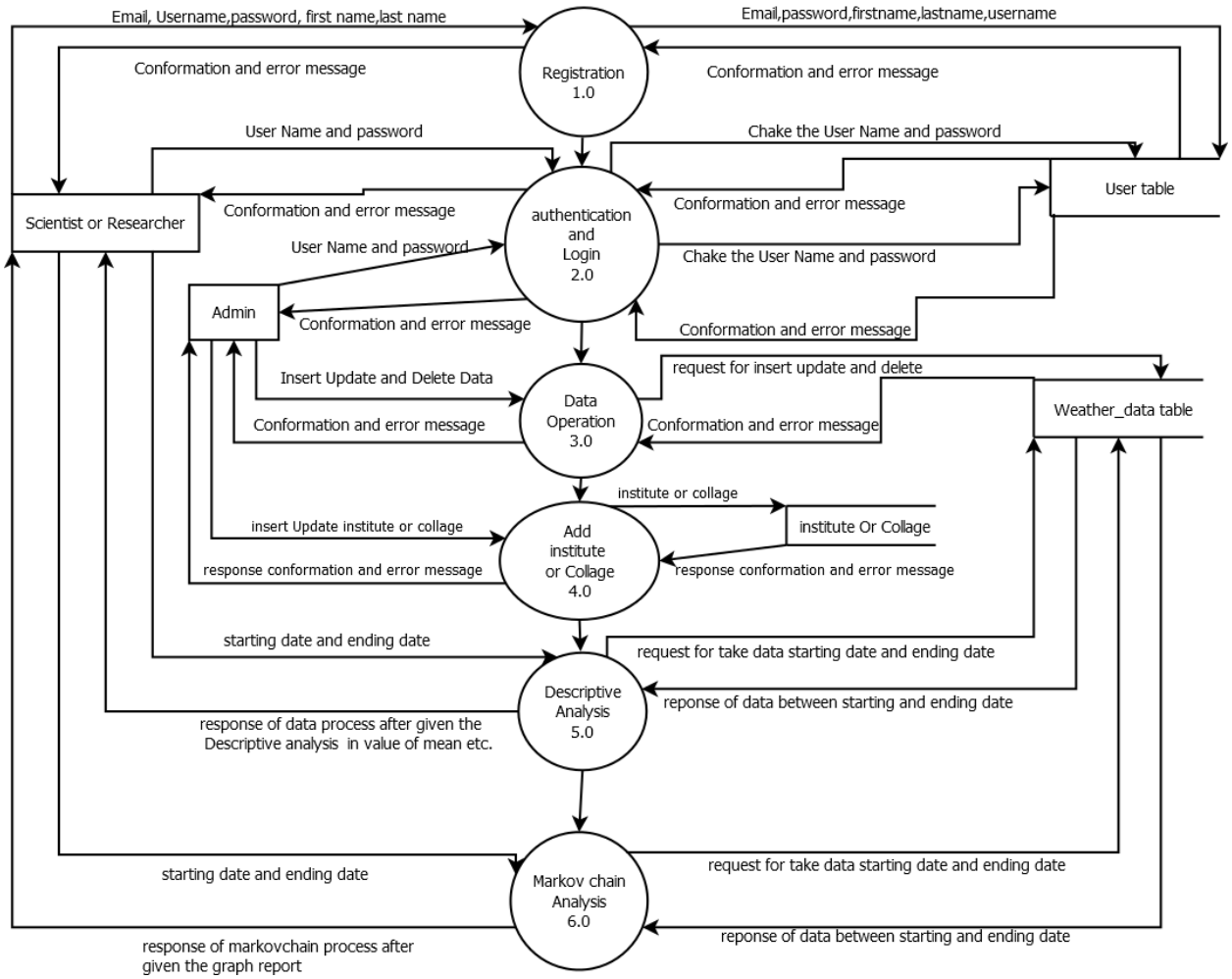
7.1. Context Diagram or Level-0 Diagram



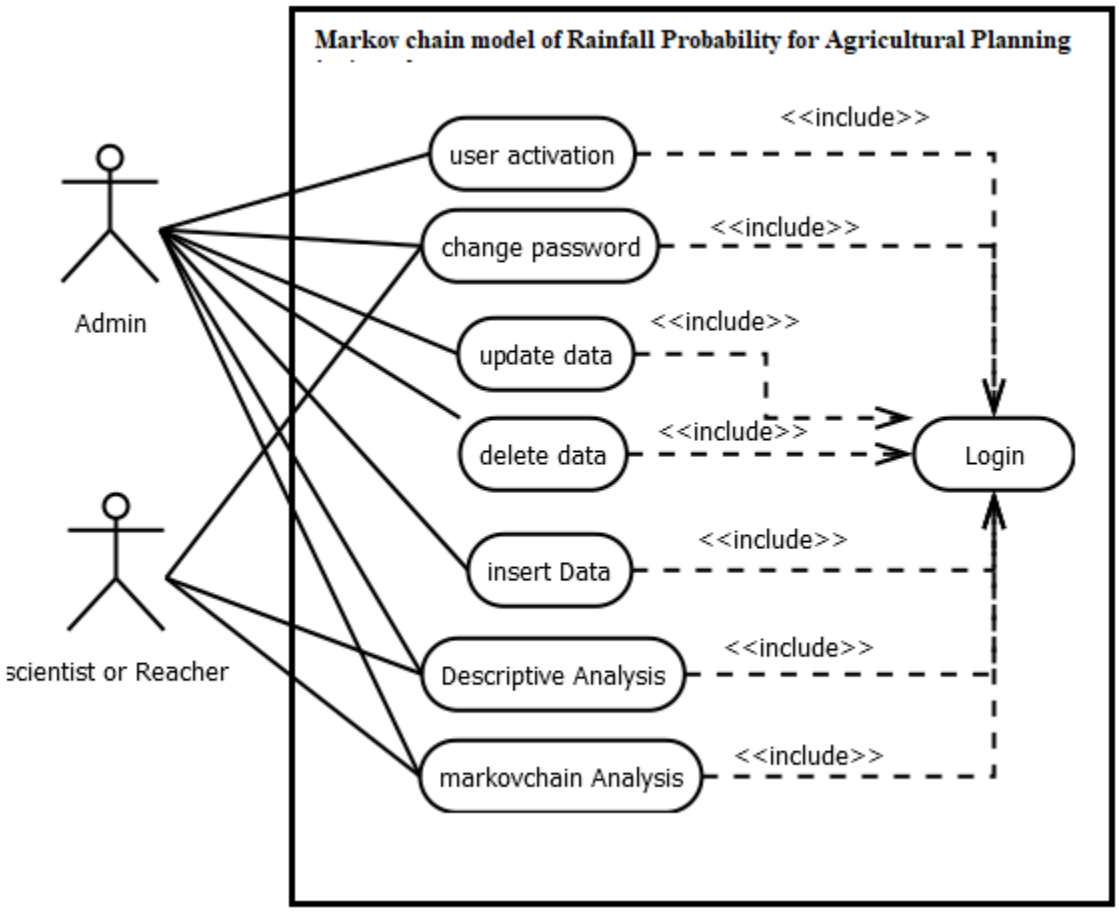
7.2. Entity Relationship Diagram



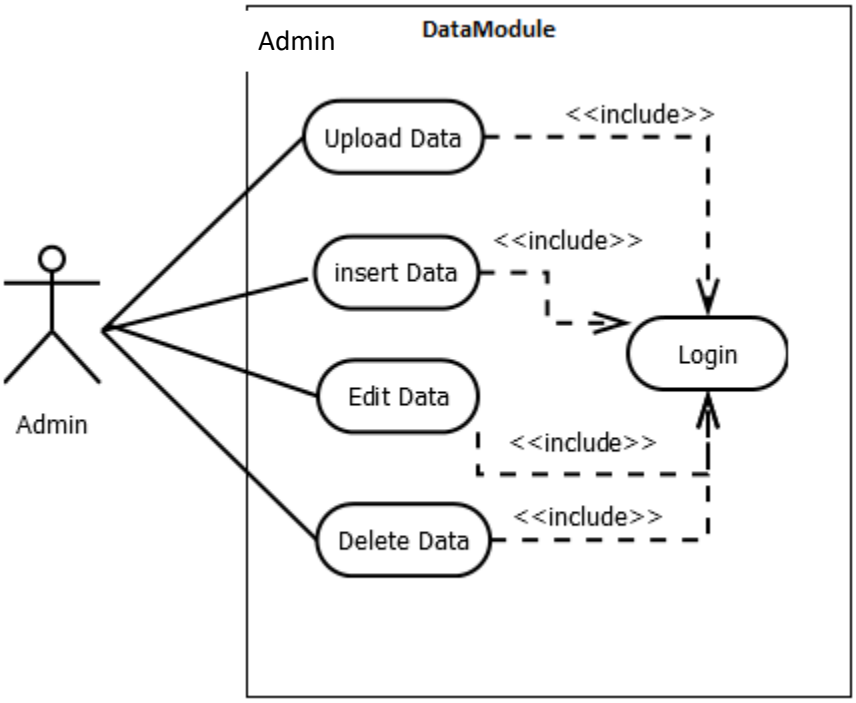
7.3. Level-1 Diagram



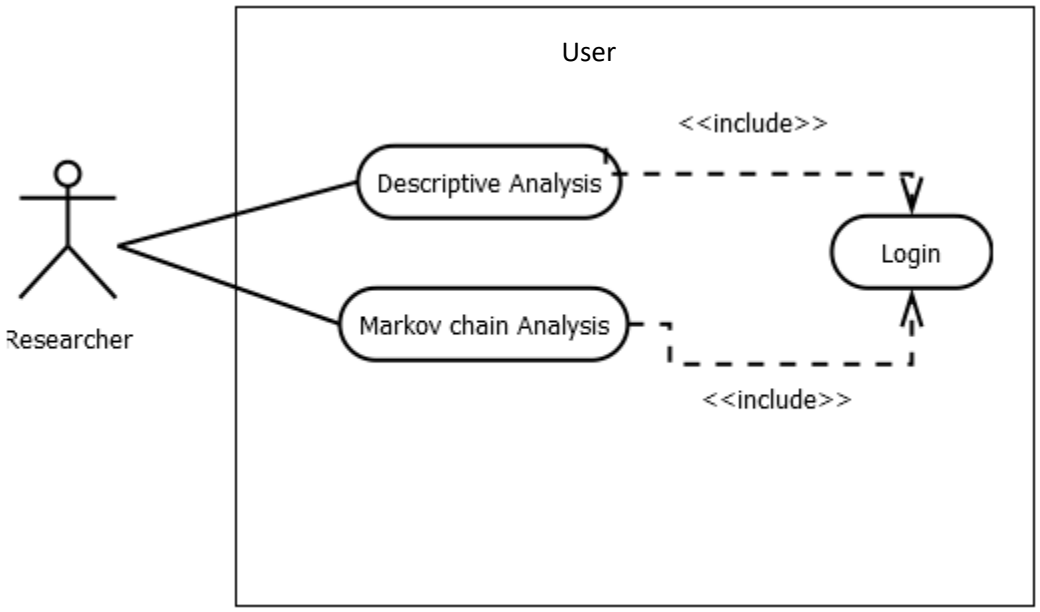
7.4 Use case Diagram



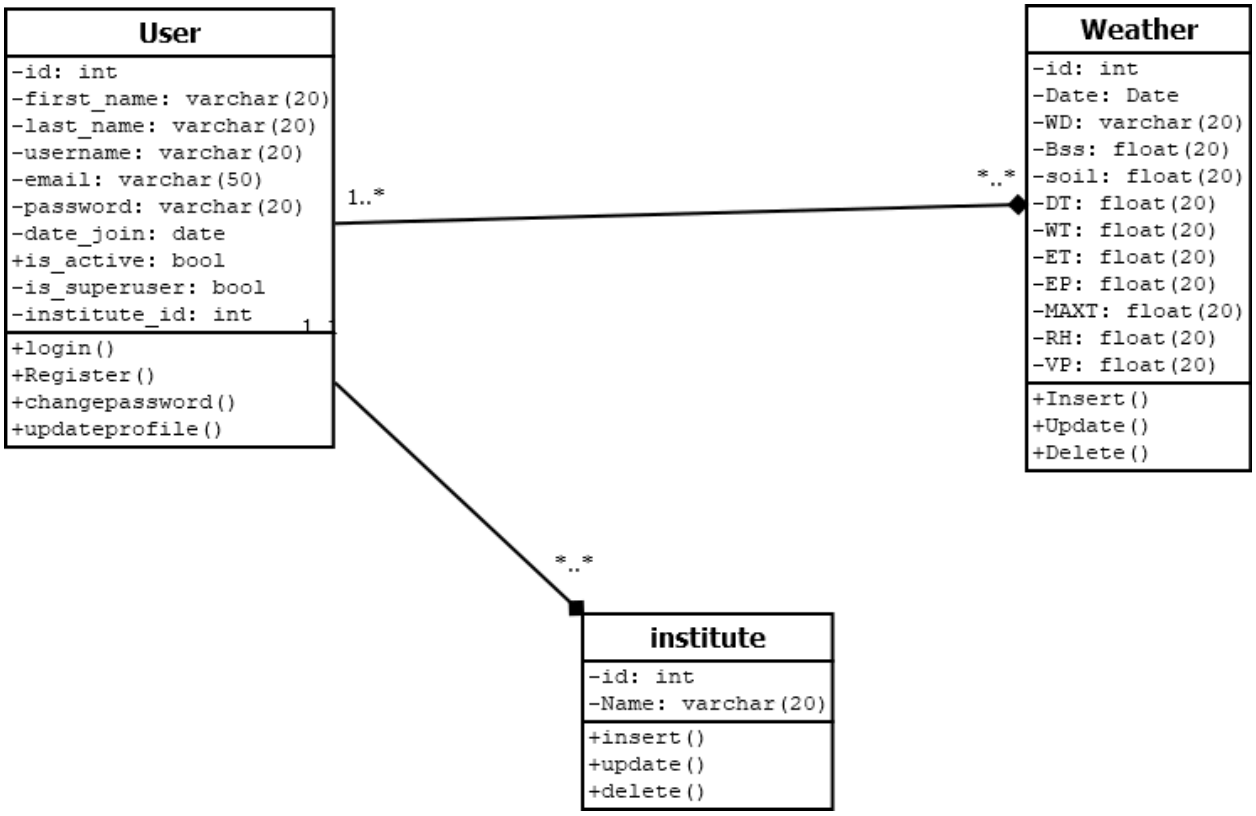
Admin Module



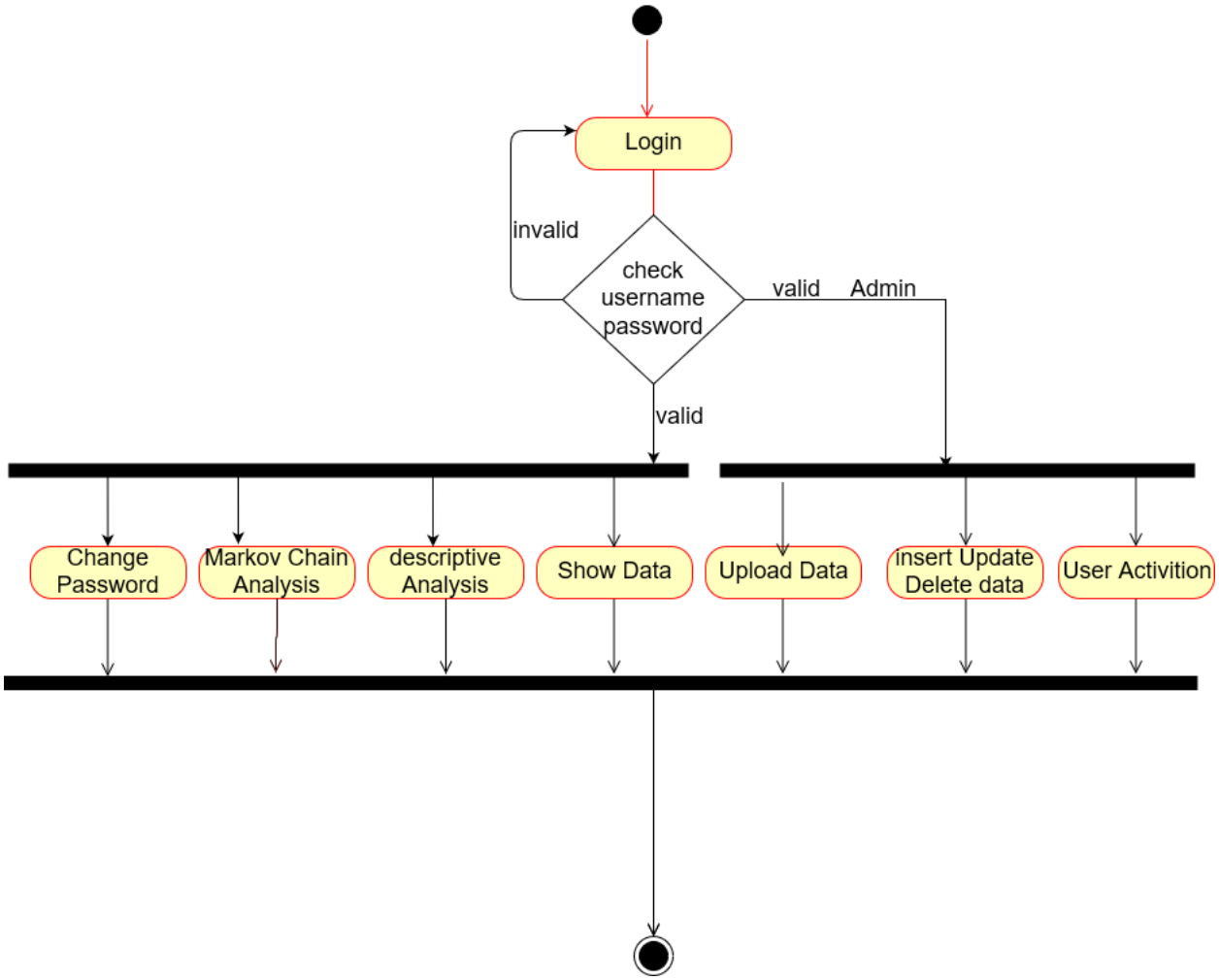
Users



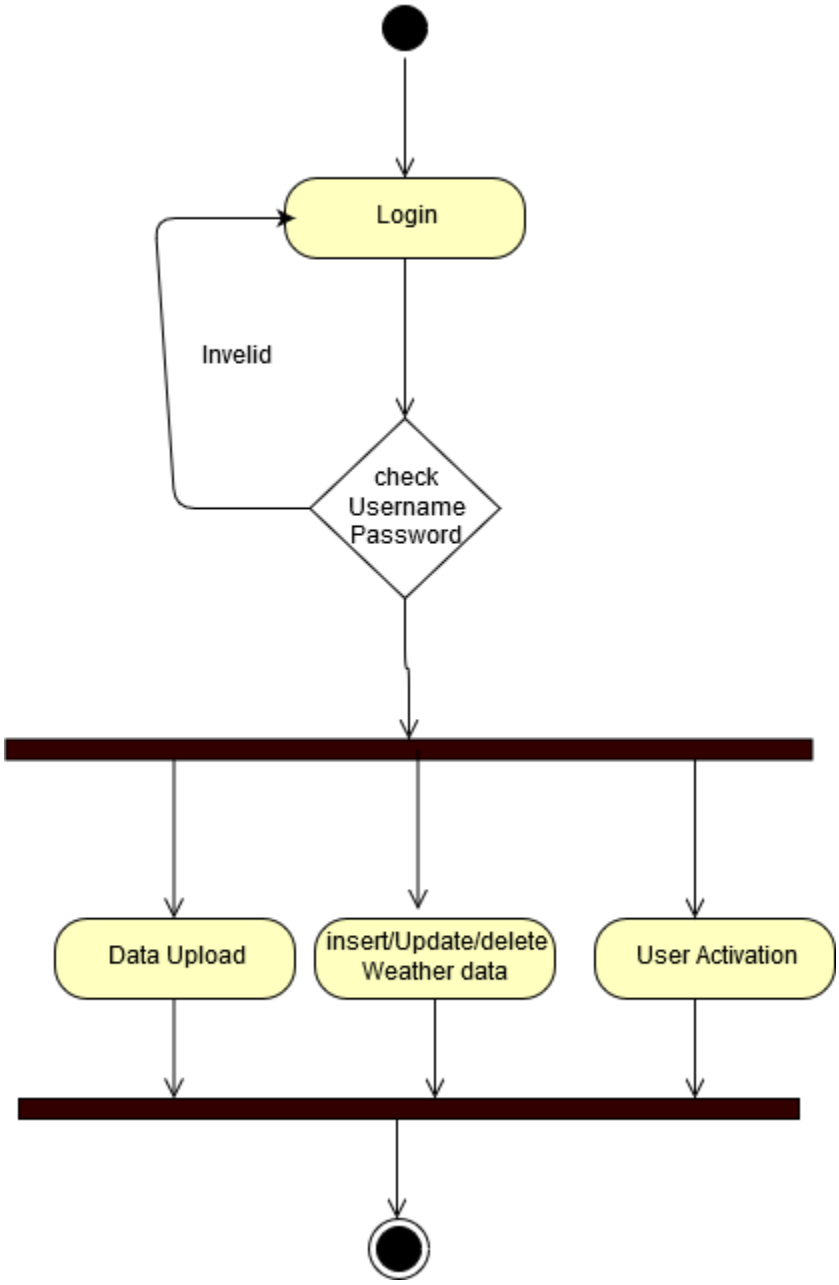
7.5 Class Diagram



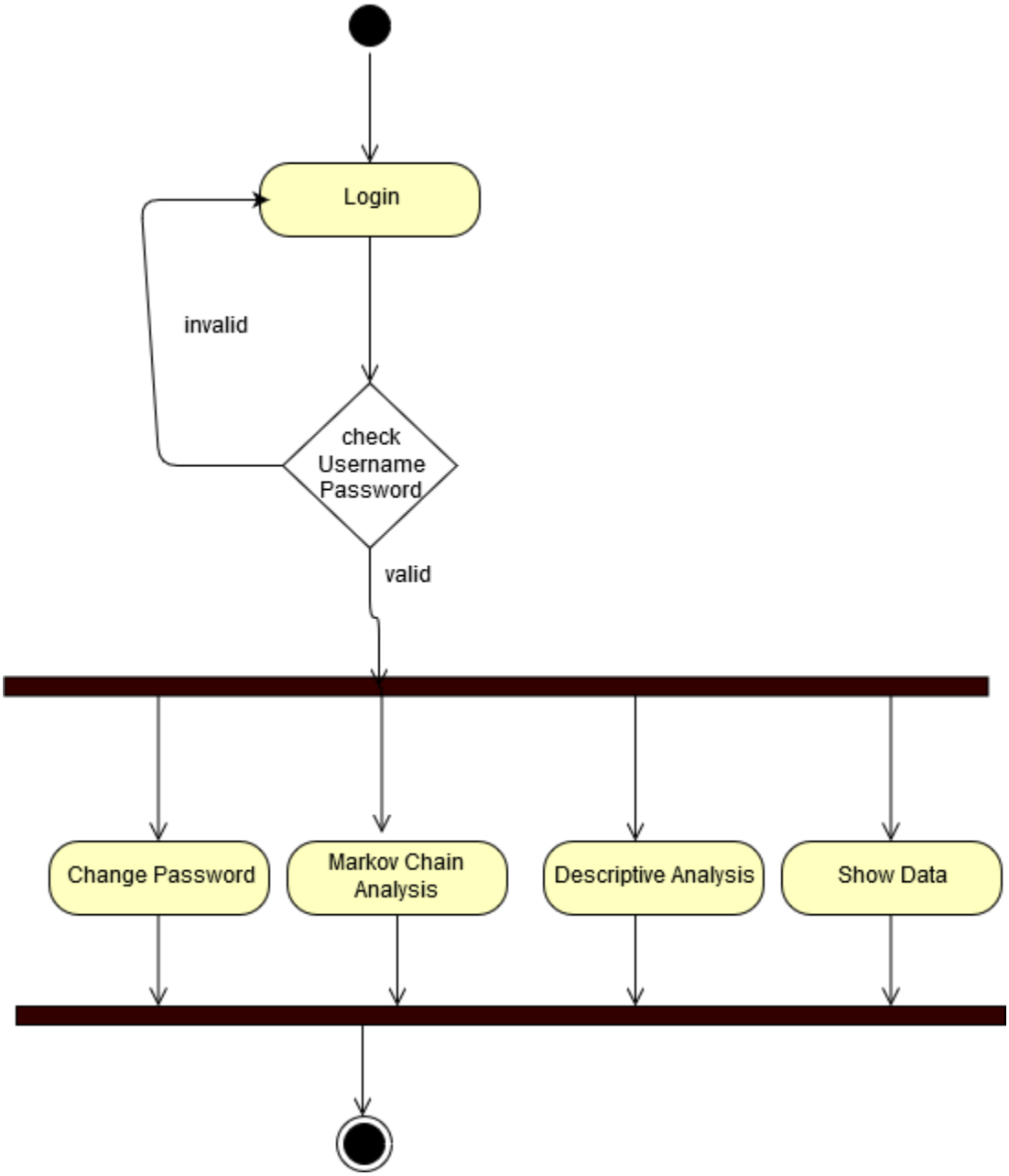
7.6 Activity Diagram



Admin Module



Users Module

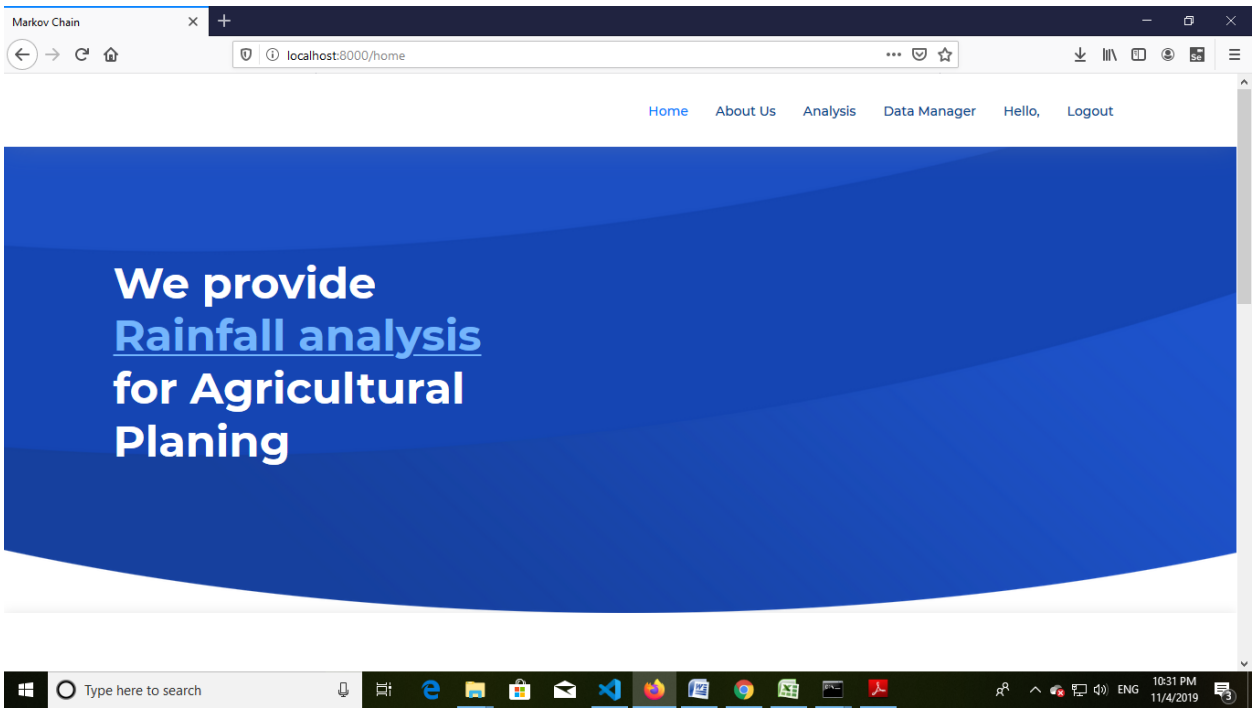


8. System Screenshots

8.1. General Screenshots

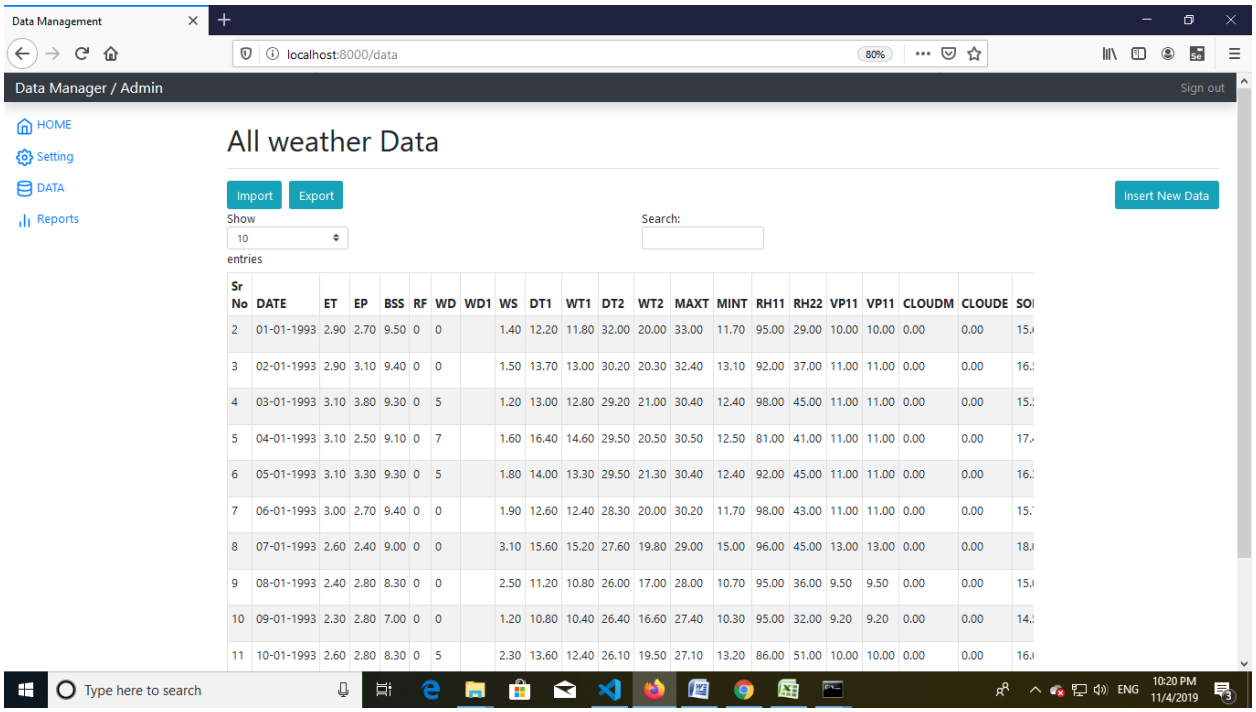
1. Home Page

- This is image of Home Page

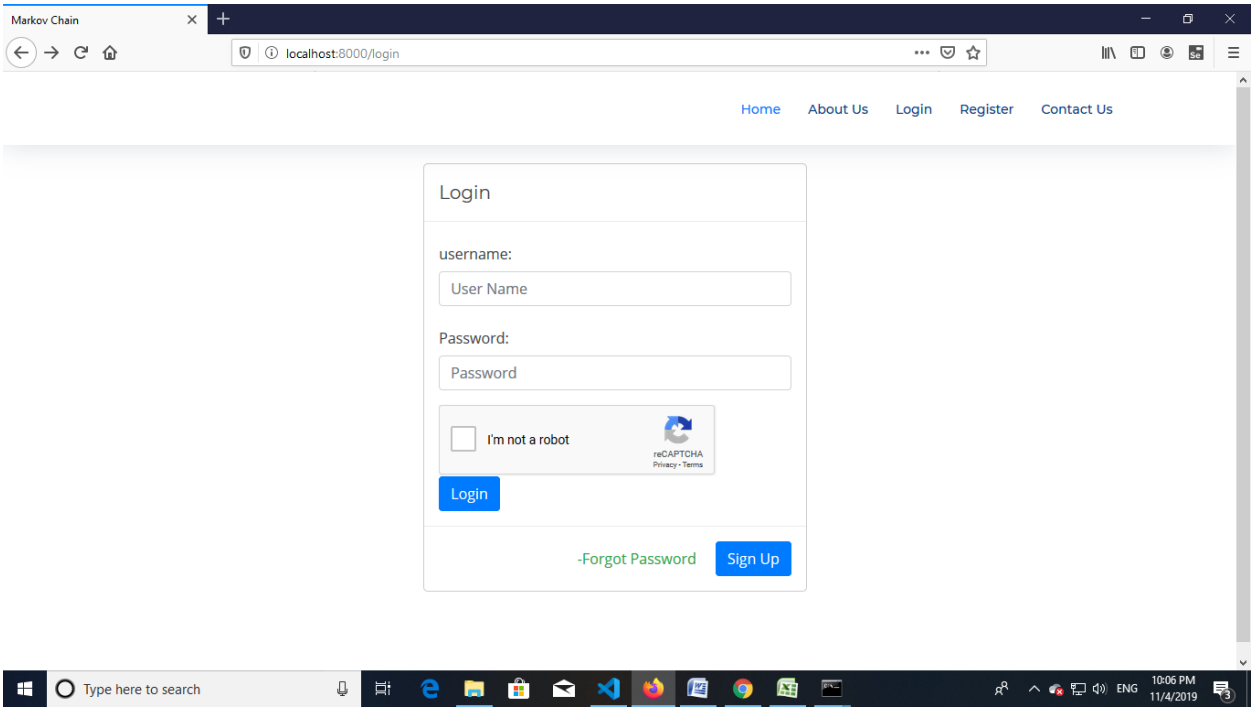


2. Weather Data

- This is image of all Weather data show in Admin Login.



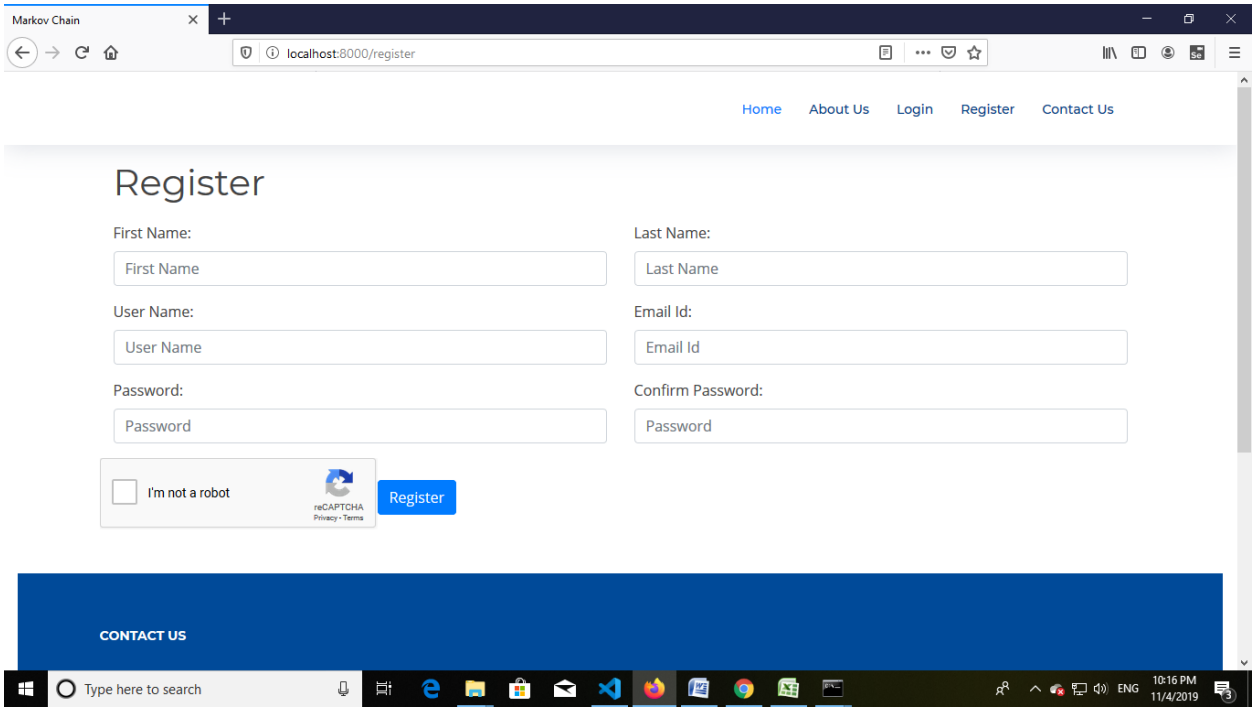
3. Login Page



- This image of login page.

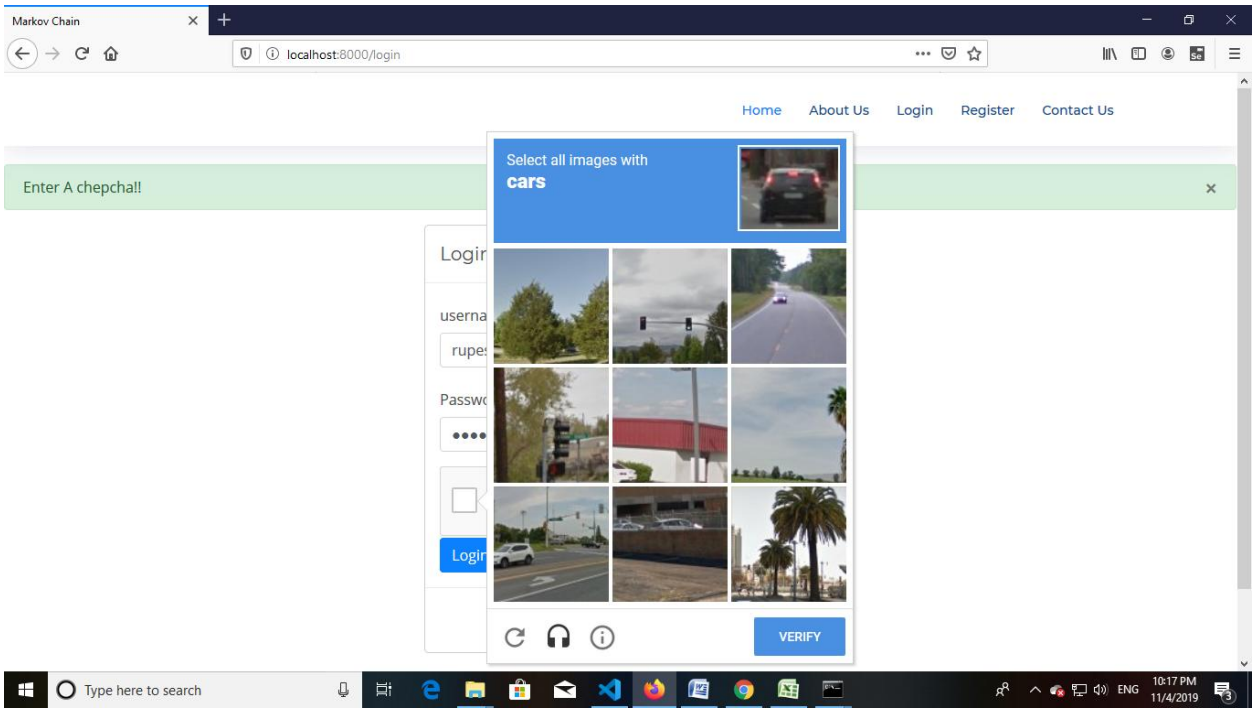
4. Registration Page

- This image of Registration page.



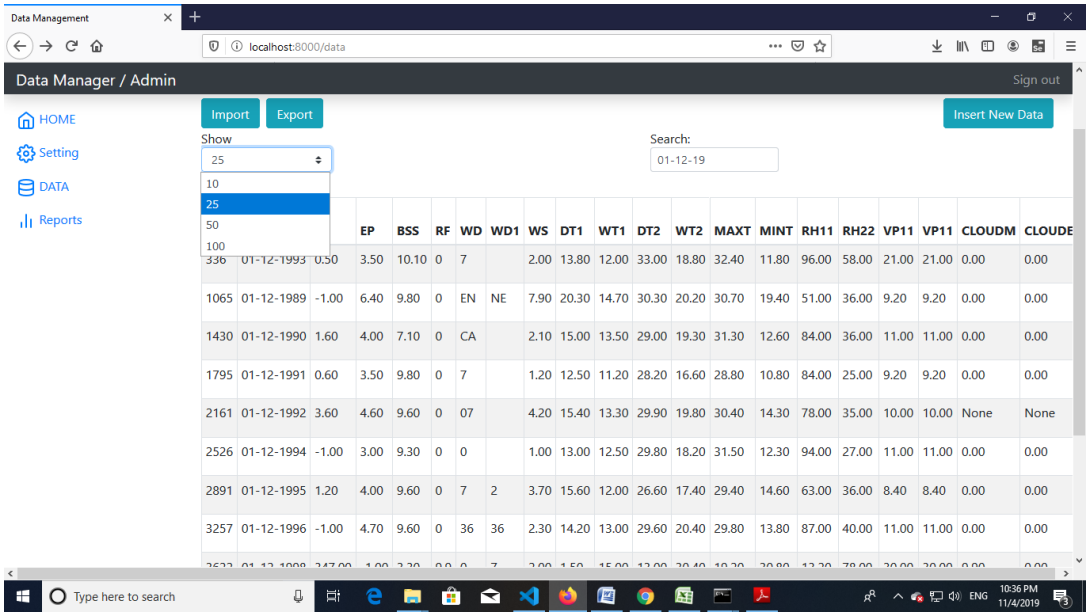
6. Chepcha verification

- This image of re-CAPTCHA verification



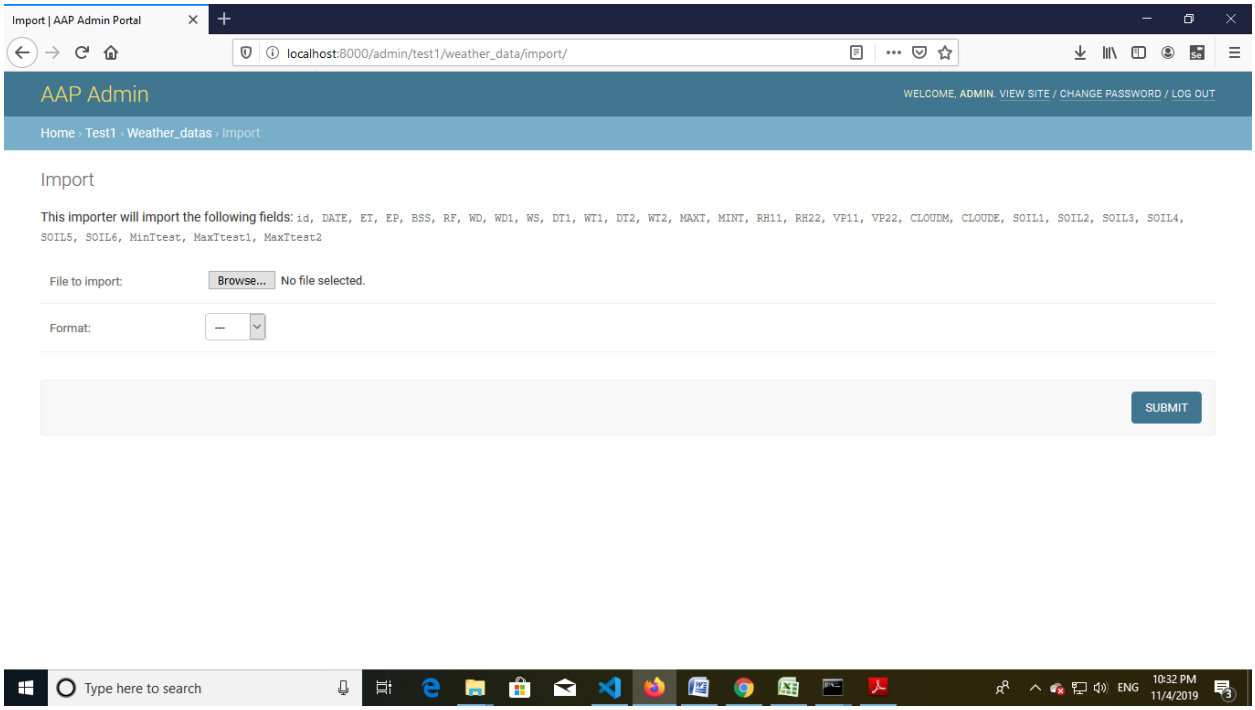
7. Filter Data

- This image of filter data page.



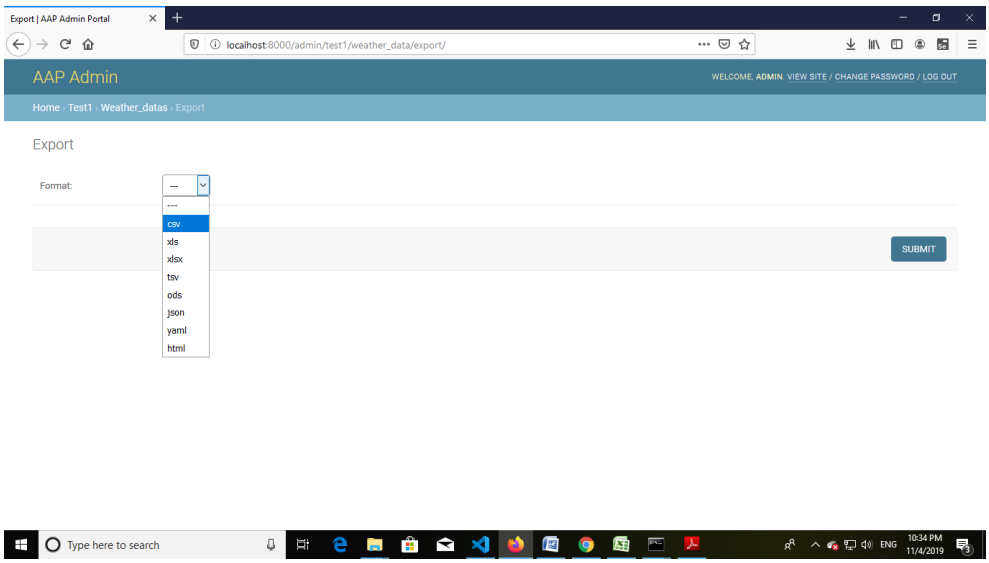
8. Import Data

- This image of import data in Weather dateable.
- This page through insert the csv file.



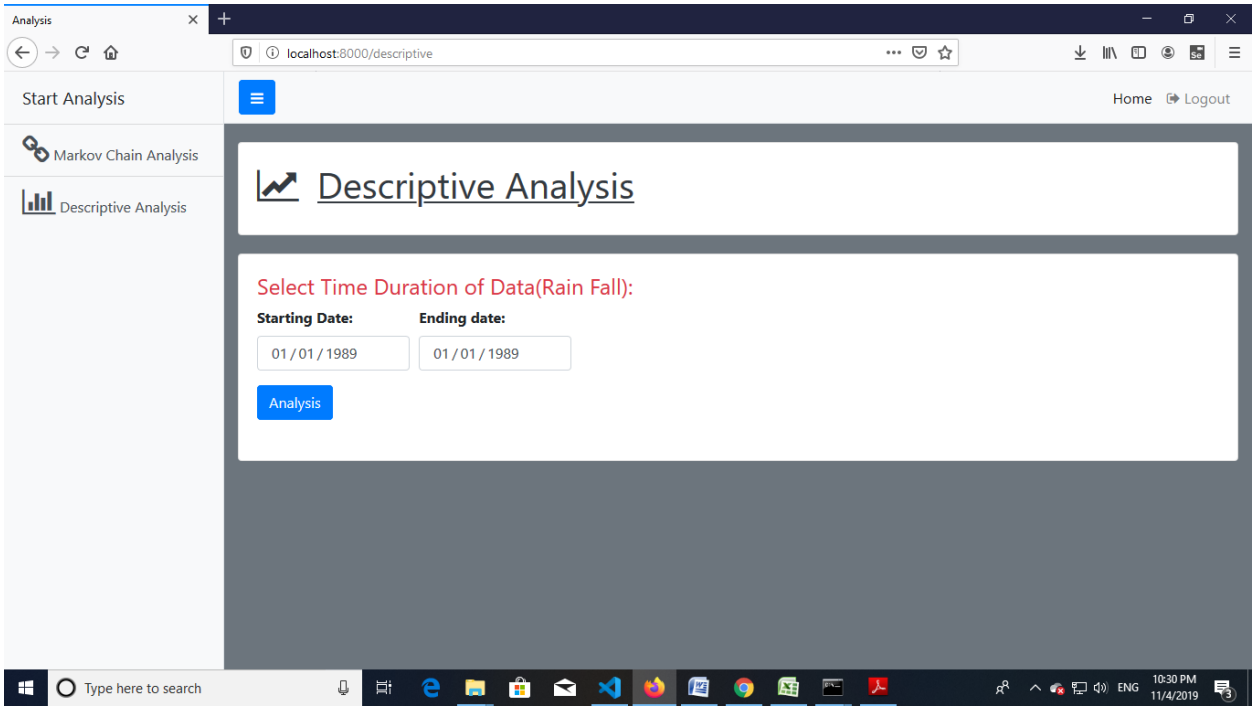
9. Export Data

- This image of Export Data in csv file and other file format.

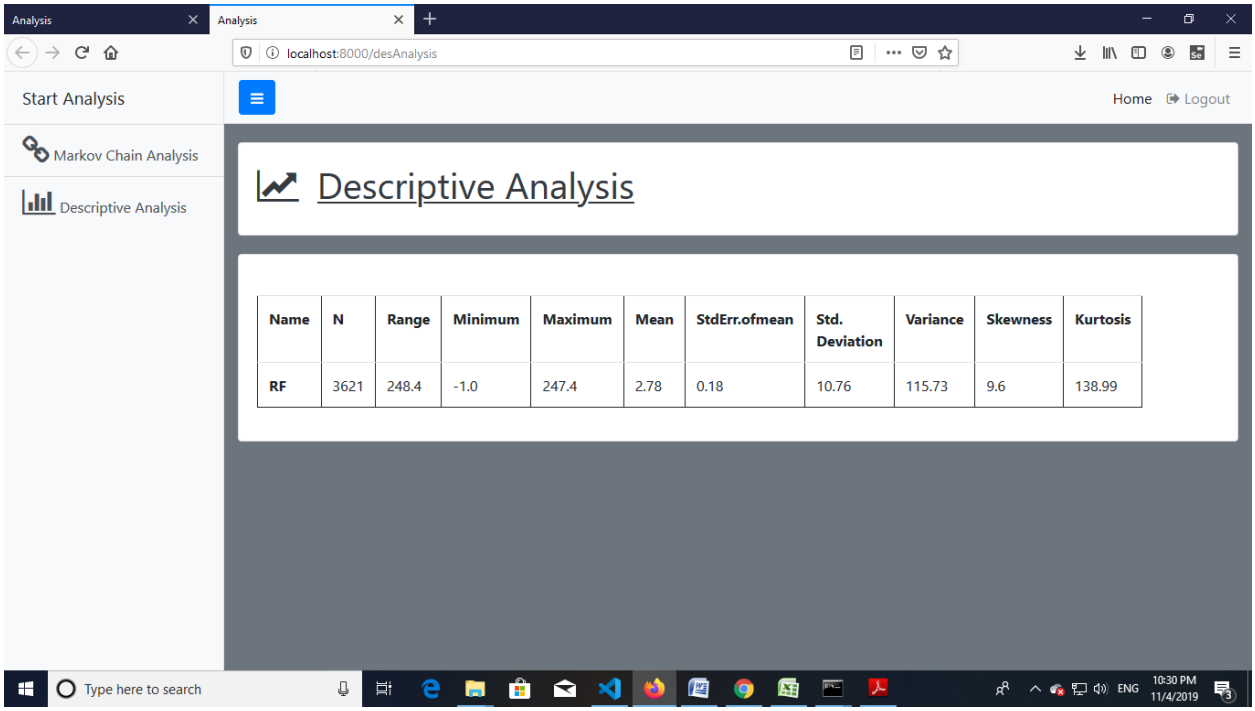


10. Analysis Module

A. Descriptive Analysis

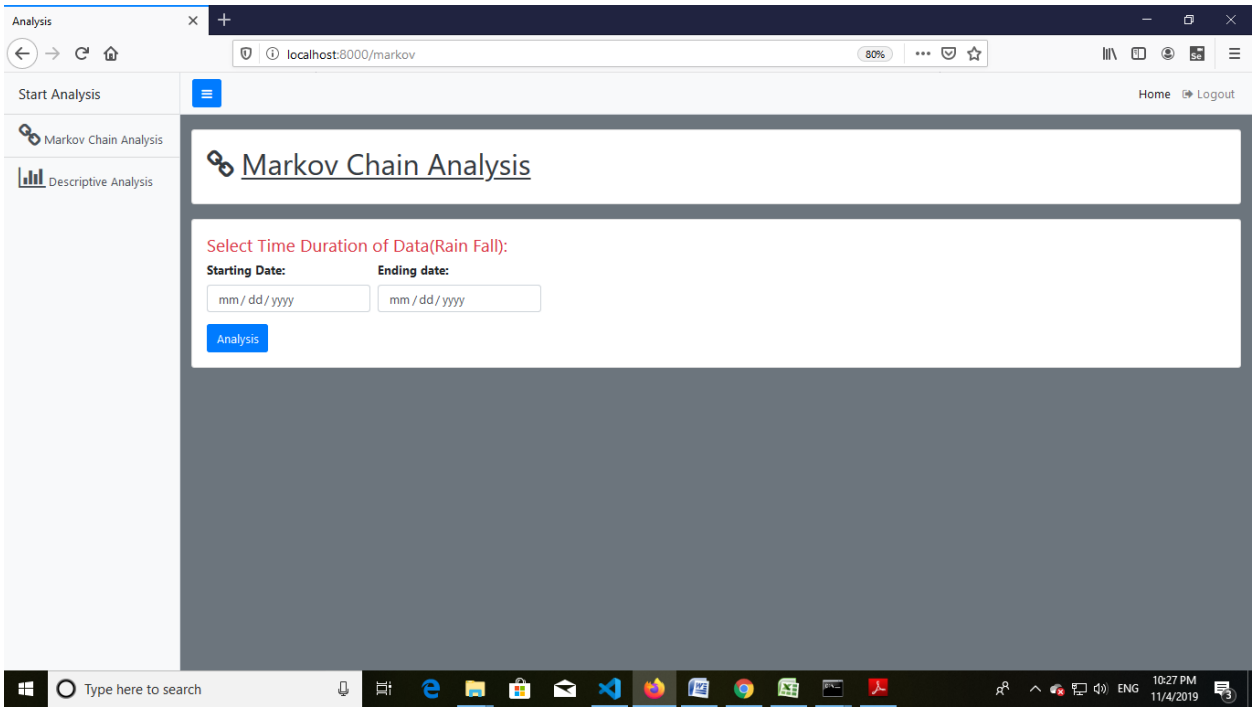


- This image in selected date and after click the Analysis button .

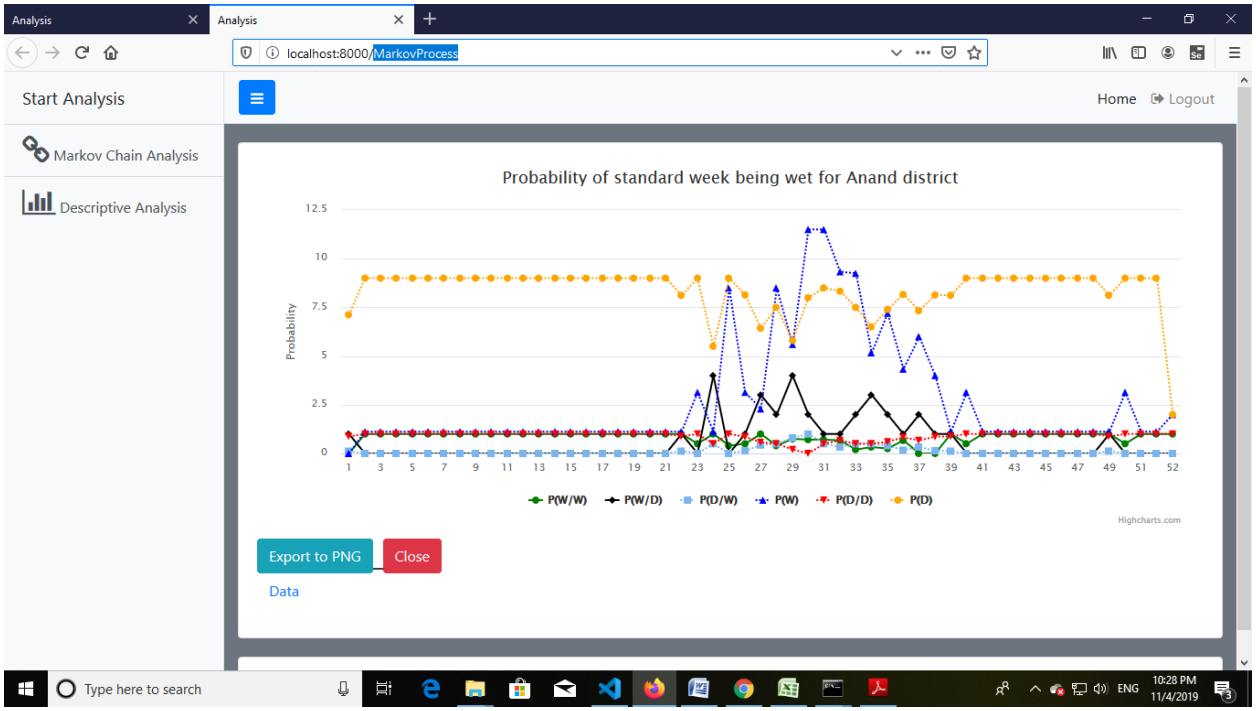


- This is image of Descriptive Analysis of Answer.

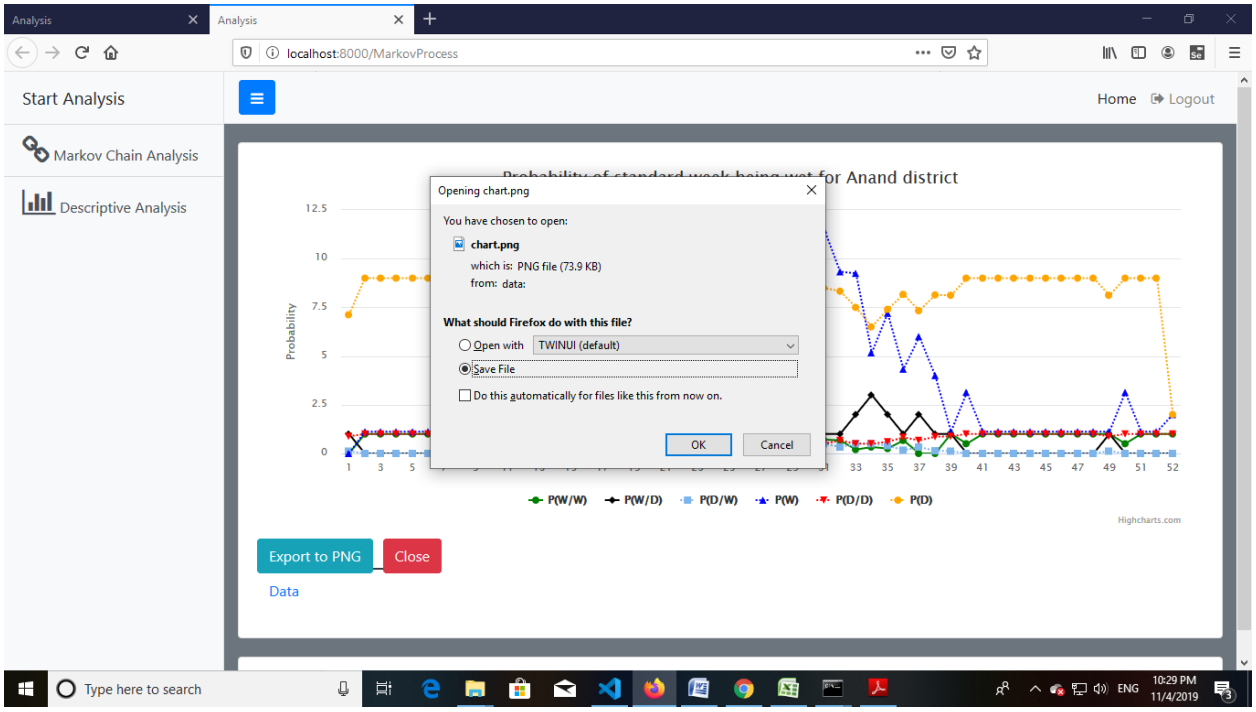
B. Markov chain Analysis



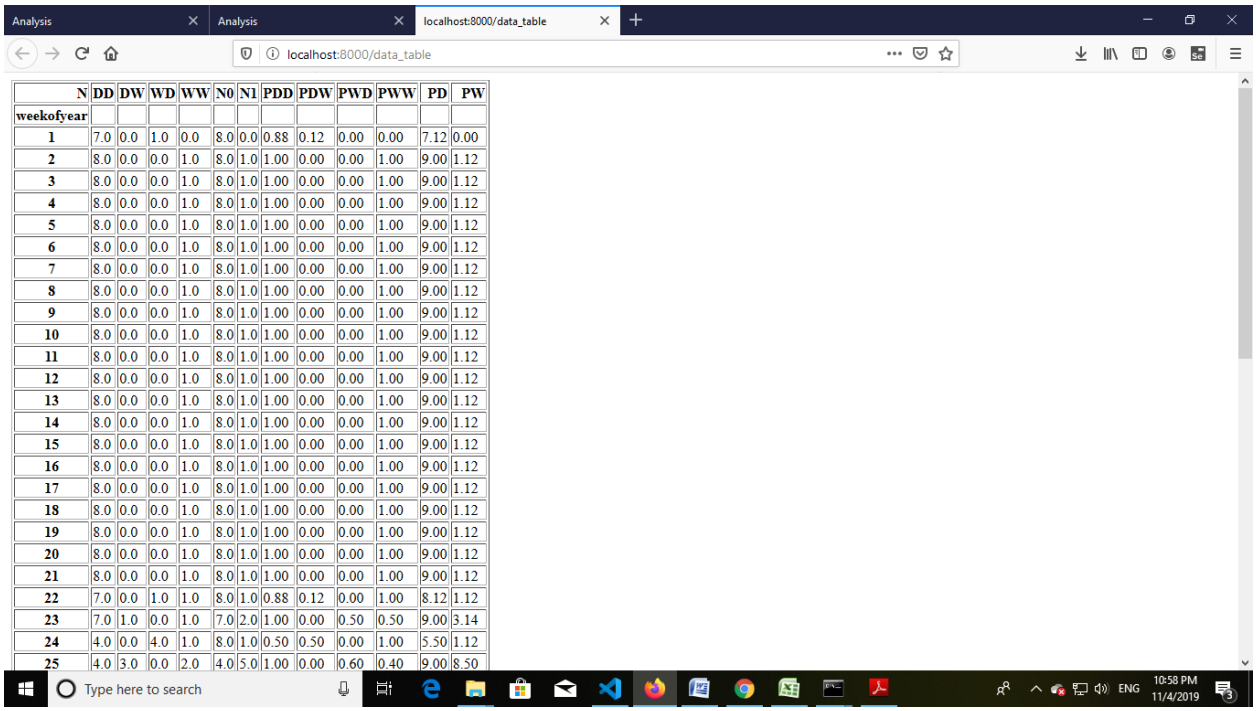
- This Page in select the date and after click the Analysis button.



- This page in Analysis of graph of Markov chain Analysis.



- This image of export graph of image.

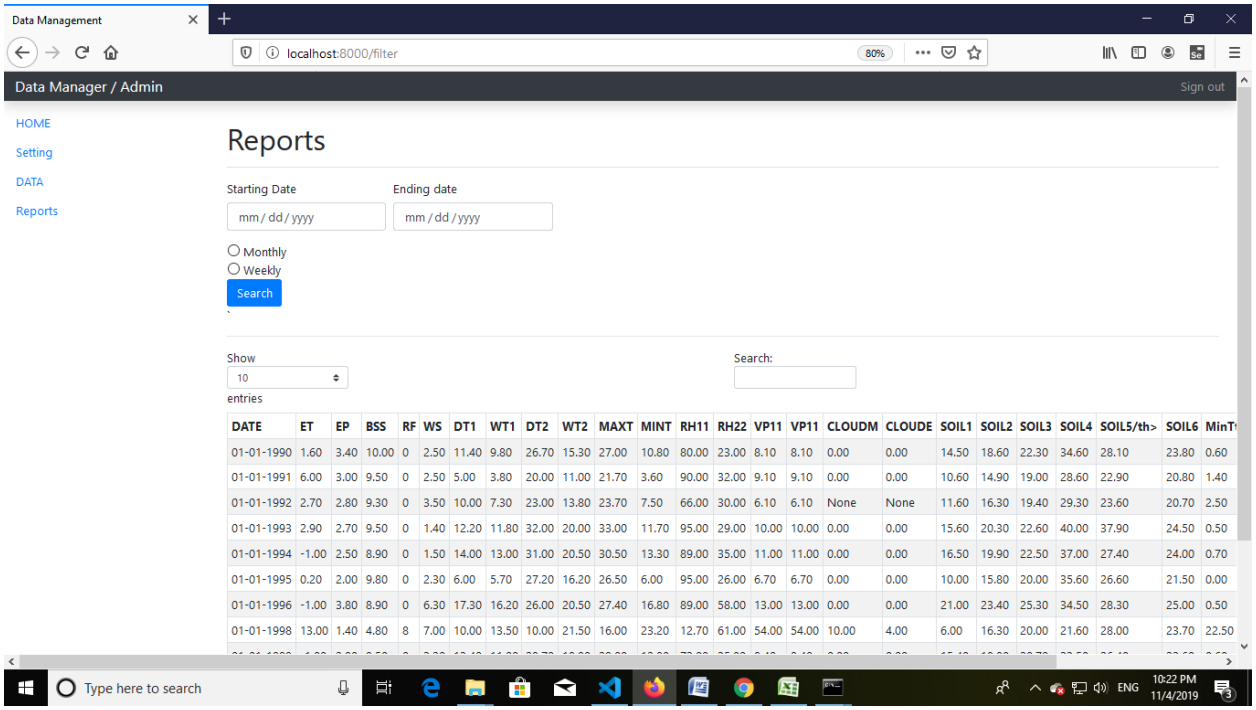


N	DD	DW	WD	WW	N0	N1	PDD	PDW	PWD	PWW	PD	PW
weekofyear												
1	7.0	0.0	1.0	0.0	8.0	0.0	0.88	0.12	0.00	0.00	7.12	0.00
2	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
3	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
4	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
5	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
6	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
7	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
8	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
9	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
10	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
11	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
12	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
13	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
14	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
15	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
16	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
17	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
18	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
19	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
20	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
21	8.0	0.0	0.0	1.0	8.0	1.0	1.00	0.00	0.00	1.00	9.00	1.12
22	7.0	0.0	1.0	1.0	8.0	1.0	0.88	0.12	0.00	1.00	8.12	1.12
23	7.0	1.0	0.0	1.0	7.0	2.0	1.00	0.00	0.50	0.50	9.00	3.14
24	4.0	0.0	4.0	1.0	8.0	1.0	0.50	0.50	0.00	1.00	5.50	1.12
25	4.0	3.0	0.0	2.0	4.0	5.0	1.00	0.00	0.60	0.40	9.00	8.50

- This image in Data of Markov chain Analysis of Graph Data.

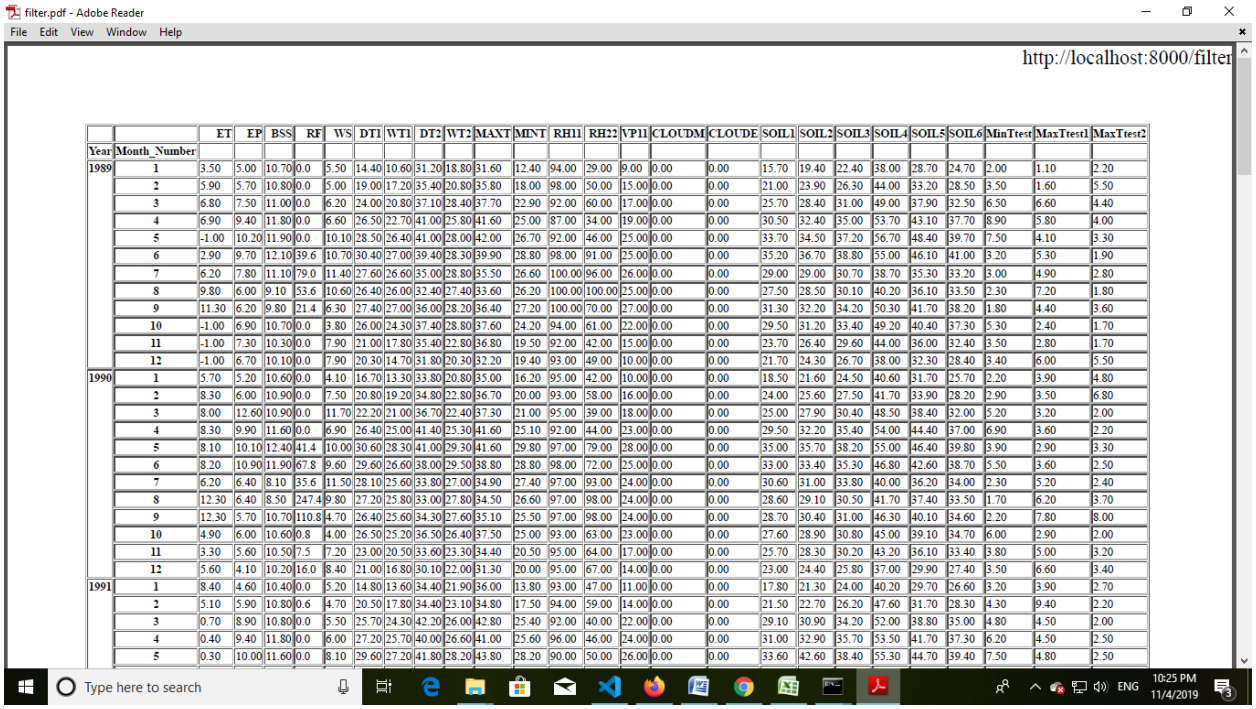
9. Report

A. Daily Report



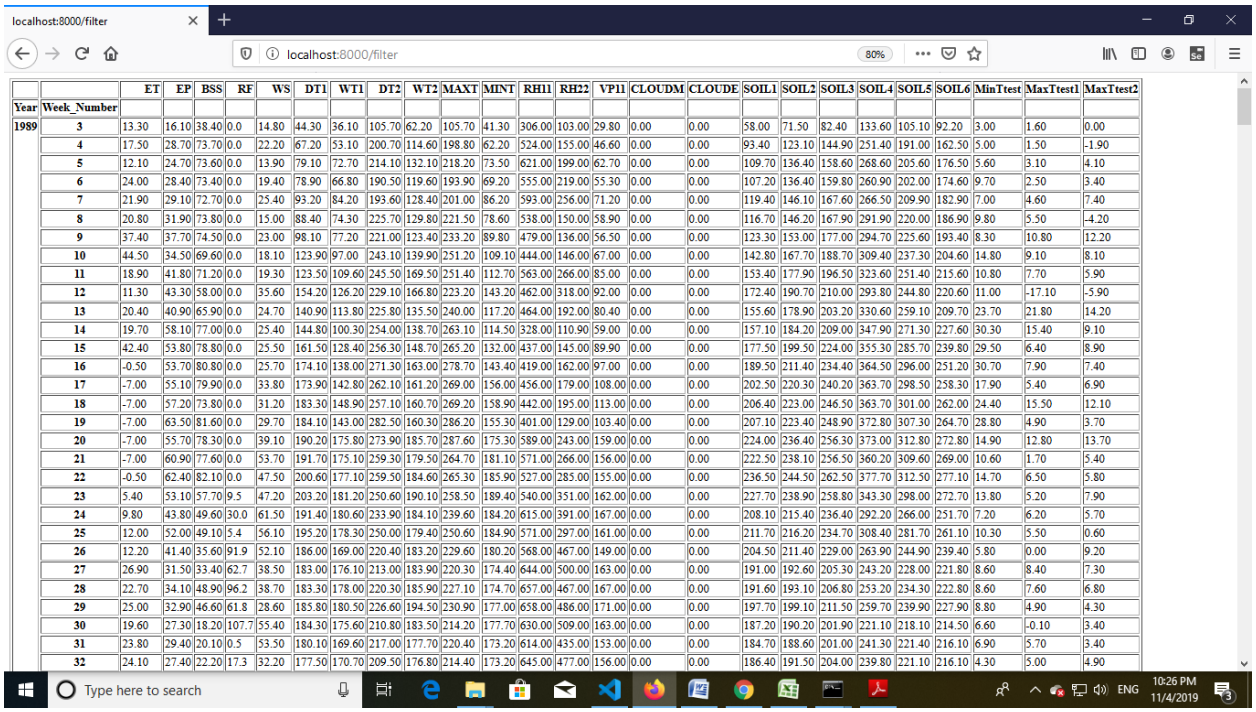
DATE	ET	EP	BSS	RF	WS	DT1	WT1	DT2	WT2	MAXT	MINT	RH11	RH22	VP11	VP11	CLOUDM	CLOUDE	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5/th>	SOIL6	MinT
01-01-1990	1.60	3.40	10.00	0	2.50	11.40	9.80	26.70	15.30	27.00	10.80	80.00	23.00	8.10	8.10	0.00	0.00	14.50	18.60	22.30	34.60	28.10	23.80	0.60
01-01-1991	6.00	3.00	9.50	0	2.50	5.00	3.80	20.00	11.00	21.70	3.60	90.00	32.00	9.10	9.10	0.00	0.00	10.60	14.90	19.00	28.60	22.90	20.80	1.40
01-01-1992	2.70	2.80	9.30	0	3.50	10.00	7.30	23.00	13.80	23.70	7.50	66.00	30.00	6.10	6.10	None	None	11.60	16.30	19.40	29.30	23.60	20.70	2.50
01-01-1993	2.90	2.70	9.50	0	1.40	12.20	11.80	32.00	20.00	33.00	11.70	95.00	29.00	10.00	10.00	0.00	0.00	15.60	20.30	22.60	40.00	37.90	24.50	0.50
01-01-1994	-1.00	2.50	8.90	0	1.50	14.00	13.00	31.00	20.50	30.50	13.30	89.00	35.00	11.00	11.00	0.00	0.00	16.50	19.90	22.50	37.00	27.40	24.00	0.70
01-01-1995	0.20	2.00	9.80	0	2.30	6.00	5.70	27.20	16.20	26.50	6.00	95.00	26.00	6.70	6.70	0.00	0.00	10.00	15.80	20.00	35.60	26.60	21.50	0.00
01-01-1996	-1.00	3.80	8.90	0	6.30	17.30	16.20	26.00	20.50	27.40	16.80	89.00	58.00	13.00	13.00	0.00	0.00	21.00	23.40	25.30	34.50	28.30	25.00	0.50
01-01-1998	13.00	1.40	4.80	8	7.00	10.00	13.50	10.00	21.50	16.00	23.20	12.70	61.00	54.00	54.00	10.00	4.00	6.00	16.30	20.00	21.60	28.00	23.70	22.50

B. Monthly Data



		ET	EP	BSS	RF	WS	DT1	WT1	DT2	WT2	MAXT	MINT	RH11	RH22	VP11	CLOUDM	CLOUDE	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5	SOIL6	MinTtest	MaxTtest1	MaxTtest2
Year	Month_Number																									
1989	1	3.50	5.00	10.70	0.0	5.50	14.40	10.60	31.20	18.80	31.60	12.40	94.00	29.00	9.00	0.00	0.00	15.70	19.40	22.40	38.00	28.70	24.70	2.00	1.10	2.20
	2	5.90	5.70	10.80	0.0	5.00	19.00	17.20	35.40	20.80	35.80	18.00	98.00	50.00	15.00	0.00	0.00	21.00	23.90	26.30	44.00	33.20	28.50	3.50	1.60	5.50
	3	6.80	7.50	11.00	0.0	6.20	24.00	20.80	37.10	28.40	37.70	22.90	92.00	60.00	17.00	0.00	0.00	25.70	28.40	31.00	49.00	37.90	32.50	6.50	6.60	4.40
	4	6.90	9.40	11.80	0.0	6.60	26.50	22.70	41.00	25.80	41.60	25.00	87.00	34.00	19.00	0.00	0.00	30.50	32.40	35.00	53.70	43.10	37.70	8.90	5.80	4.00
	5	-1.00	10.20	11.90	0.0	10.10	28.50	26.40	41.00	28.00	42.00	26.70	92.00	46.00	25.00	0.00	0.00	33.70	34.50	37.20	56.70	48.40	39.70	7.50	4.10	3.30
	6	2.90	9.70	12.10	39.6	10.70	30.40	27.00	39.40	28.30	39.90	28.80	98.00	91.00	25.00	0.00	0.00	35.20	36.70	38.80	55.00	46.10	41.00	3.20	5.30	1.90
	7	6.20	7.80	11.10	79.0	11.40	27.60	26.60	35.00	28.80	35.50	26.60	100.00	96.00	26.00	0.00	0.00	29.00	29.00	30.70	38.70	35.30	33.20	3.00	4.90	2.80
	8	9.80	6.00	9.10	53.6	10.60	26.40	26.00	32.40	27.40	33.60	26.20	100.00	100.00	25.00	0.00	0.00	27.50	28.50	30.10	40.20	36.10	33.50	2.30	7.20	1.80
	9	11.30	6.20	9.80	21.4	6.30	27.40	27.00	36.00	28.20	36.40	27.20	100.00	70.00	27.00	0.00	0.00	31.30	32.20	34.20	50.30	41.70	38.20	1.80	4.40	3.60
	10	-1.00	6.90	10.70	0.0	3.80	26.00	24.30	37.40	28.80	37.60	24.20	94.00	61.00	22.00	0.00	0.00	29.50	31.20	33.40	49.20	40.40	37.30	5.30	2.40	1.70
	11	-1.00	7.30	10.30	0.0	7.90	21.00	17.80	35.40	22.80	36.80	19.50	92.00	42.00	15.00	0.00	0.00	23.70	26.40	29.60	44.00	36.00	32.40	3.50	2.80	1.70
	12	-1.00	6.70	10.10	0.0	7.90	20.30	14.70	31.80	20.30	32.20	19.40	93.00	49.00	10.00	0.00	0.00	21.70	24.30	26.70	38.00	32.30	28.40	3.40	6.00	5.50
1990	1	5.70	5.20	10.60	0.0	4.10	16.70	13.30	33.80	20.80	35.00	16.20	95.00	42.00	10.00	0.00	0.00	18.50	21.60	24.50	40.60	31.70	25.70	2.20	3.90	4.80
	2	8.30	6.00	10.90	0.0	7.50	20.80	19.20	34.80	22.80	36.70	20.00	93.00	58.00	16.00	0.00	0.00	24.00	25.60	27.50	41.70	33.90	28.20	2.90	3.50	6.80
	3	8.00	12.60	10.90	0.0	11.70	22.20	21.00	36.70	22.40	37.30	21.00	95.00	39.00	18.00	0.00	0.00	25.00	27.90	30.40	48.50	38.40	32.00	5.20	3.20	2.00
	4	8.30	9.90	11.60	0.0	6.90	26.40	25.00	41.40	25.30	41.60	25.10	92.00	44.00	23.00	0.00	0.00	29.50	32.20	35.40	54.00	44.40	37.00	6.90	3.60	2.20
	5	8.10	10.10	12.40	41.4	10.00	30.60	28.30	41.00	29.30	41.60	29.80	97.00	79.00	28.00	0.00	0.00	35.00	35.70	38.20	55.00	46.40	39.80	3.90	2.90	3.30
	6	8.20	10.90	11.90	67.8	9.60	29.60	26.60	38.00	29.50	38.80	28.80	98.00	72.00	25.00	0.00	0.00	33.00	33.40	35.30	46.80	42.60	38.70	5.50	3.60	2.50
	7	6.20	6.40	8.10	35.6	11.50	28.10	25.60	33.80	27.00	34.90	27.40	97.00	93.00	24.00	0.00	0.00	30.60	31.00	33.80	40.00	36.20	34.00	2.30	5.20	2.40
	8	12.30	6.40	8.50	247.4	9.80	27.20	25.80	33.00	27.80	34.50	26.60	97.00	98.00	24.00	0.00	0.00	28.60	29.10	30.50	41.70	37.40	33.50	1.70	6.20	3.70
	9	12.30	5.70	10.70	110.8	4.70	26.40	25.60	34.30	27.60	35.10	25.50	97.00	98.00	24.00	0.00	0.00	28.70	30.40	31.00	46.30	40.10	34.60	2.20	7.80	8.00
	10	4.90	6.00	10.60	0.8	4.00	26.50	25.20	36.50	26.40	37.50	25.00	93.00	63.00	23.00	0.00	0.00	27.60	28.90	30.80	45.00	39.10	34.70	6.00	2.90	2.00
	11	3.30	5.60	10.50	7.5	7.20	23.00	20.50	33.60	23.30	34.40	20.50	95.00	64.00	17.00	0.00	0.00	25.70	28.30	30.20	43.20	36.10	33.40	3.80	5.00	3.20
	12	5.60	4.10	10.20	16.0	8.40	21.00	16.80	30.10	22.00	31.30	20.00	95.00	67.00	14.00	0.00	0.00	23.00	24.40	25.80	37.00	29.90	27.40	3.50	6.60	3.40
1991	1	8.40	4.60	10.40	0.0	5.20	14.80	13.60	34.40	21.90	36.00	13.80	93.00	47.00	11.00	0.00	0.00	17.80	21.30	24.00	40.20	29.70	26.60	3.20	3.90	2.70
	2	5.10	5.90	10.80	0.6	4.70	20.50	17.80	34.40	23.10	34.80	17.50	94.00	59.00	14.00	0.00	0.00	21.50	22.70	26.20	47.60	31.70	28.30	4.30	9.40	2.20
	3	0.70	8.90	10.80	0.0	5.50	25.70	24.30	42.20	26.00	42.80	25.40	92.00	40.00	22.00	0.00	0.00	29.10	30.90	34.20	52.00	38.80	35.00	4.80	4.50	2.00
	4	0.40	9.40	11.80	0.0	6.00	27.20	25.70	40.00	26.60	41.00	25.60	96.00	46.00	24.00	0.00	0.00	31.00	32.90	35.70	53.50	41.70	37.30	6.20	4.50	2.50
	5	0.30	10.00	11.60	0.0	8.10	29.60	27.20	41.80	28.20	43.80	28.20	90.00	50.00	26.00	0.00	0.00	33.60	42.60	38.40	55.30	44.70	39.40	7.50	4.80	2.50

C. Weekly



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Year	Week_Number	ET	EP	BSS	RF	WS	DT1	WT1	DT2	WT2	MAXT	MINT	RH11	RH22	VP11	CLOUDM	CLOUDE	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5	SOIL6	MinTtest	MaxTtest1	MaxTtest2
1989	3	13.30	16.10	38.40	0.0	14.80	44.30	36.10	105.70	62.20	105.70	41.30	306.00	103.00	29.80	0.00	0.00	58.00	71.50	82.40	133.60	105.10	92.20	3.00	1.60	0.00
	4	17.50	28.70	73.70	0.0	22.20	67.20	53.10	200.70	114.60	198.80	62.20	524.00	155.00	46.60	0.00	0.00	93.40	123.10	144.90	251.40	191.00	162.50	5.00	1.50	-1.90
	5	12.10	24.70	73.60	0.0	13.90	79.10	72.70	214.10	132.10	218.20	73.50	621.00	199.00	62.70	0.00	0.00	109.70	136.40	158.60	268.60	205.60	176.50	5.60	3.10	4.10
	6	24.00	28.40	73.40	0.0	19.40	78.90	66.80	190.50	119.60	193.90	69.20	555.00	219.00	55.30	0.00	0.00	107.20	136.40	159.80	260.90	202.00	174.60	9.70	2.50	3.40
	7	21.90	29.10	72.70	0.0	25.40	93.20	84.20	193.60	128.40	201.00	86.20	593.00	256.00	71.20	0.00	0.00	119.40	146.10	167.60	266.50	209.90	182.90	7.00	4.60	7.40
	8	20.80	31.90	73.80	0.0	15.00	88.40	74.30	225.70	129.80	221.50	78.60	538.00	150.00	58.90	0.00	0.00	116.70	146.20	167.90	291.90	220.00	186.90	9.80	5.50	-4.20
	9	37.40	37.70	74.50	0.0	23.00	98.10	77.20	221.00	123.40	233.20	89.80	479.00	136.00	56.50	0.00	0.00	123.30	153.00	177.00	294.70	225.60	193.40	8.30	10.80	12.20
	10	44.50	34.50	69.60	0.0	18.10	123.90	97.00	243.10	139.90	251.20	109.10	444.00	146.00	67.00	0.00	0.00	142.80	167.70	188.70	309.40	237.30	204.60	14.80	9.10	8.10
	11	18.90	41.80	71.20	0.0	19.30	123.50	109.60	245.50	169.50	251.40	112.70	563.00	266.00	85.00	0.00	0.00	153.40	177.90	196.50	323.60	251.40	215.60	10.80	7.70	5.90
	12	11.30	43.30	58.00	0.0	35.60	154.20	126.20	229.10	166.80	223.20	143.20	462.00	318.00	92.00	0.00	0.00	172.40	190.70	210.00	293.80	244.80	220.60	11.00	-17.10	-5.90
	13	20.40	40.90	65.90	0.0	24.70	140.90	113.80	225.80	135.50	240.00	117.20	464.00	192.00	80.40	0.00	0.00	155.60	178.90	203.20	330.60	259.10	209.70	23.70	21.80	14.20
	14	19.70	58.10	77.00	0.0	25.40	144.80	100.30	254.00	138.70	263.10	114.50	328.00	110.90	59.00	0.00	0.00	157.10	184.20	209.00	347.90	271.30	227.60	30.30	15.40	9.10
	15	42.40	53.80	78.80	0.0	25.50	161.50	128.40	256.30	148.70	265.20	132.00	437.00	145.00	89.90	0.00	0.00	177.50	199.50	224.00	355.30	285.70	239.80	29.50	6.40	8.90
	16	-0.50	53.70	80.80	0.0	25.70	174.10	138.00	271.30	163.00	278.70	143.40	419.00	162.00	97.00	0.00	0.00	189.50	211.40	234.40	364.50	296.00	251.20	30.70	7.90	7.40
	17	-7.00	55.10	79.90	0.0	33.80	173.90	142.80	262.10	161.20	269.00	156.00	456.00	179.00	108.00	0.00	0.00	202.50	220.30	240.20	363.70	298.50	258.30	17.90	5.40	6.90
	18	-7.00	57.20	73.80	0.0	31.20	183.30	148.90	257.10	160.70	269.20	158.90	442.00	195.00	113.00	0.00	0.00	206.40	223.00	246.50	363.70	301.00	262.00	24.40	15.50	12.10
	19	-7.00	63.50	81.60	0.0	29.70	184.10	143.00	282.50	160.30	286.20	155.30	401.00	129.00	103.40	0.00	0.00	207.10	223.40	248.90	372.80	307.30	264.70	28.80	4.90	3.70
	20	-7.00	55.70	78.30	0.0	39.10	190.20	175.80	273.90	185.70	287.60	175.30	589.00	243.00	159.00	0.00	0.00	224.00	236.40	256.30	373.00	312.80	272.80	14.90	12.80	13.70
	21	-7.00	60.90	77.60	0.0	53.70	191.70	175.10	259.30	179.50	264.70	181.10	571.00	266.00	156.00	0.00	0.00	222.50	238.10	256.50	360.20	309.60	269.00	10.60	1.70	5.40
	22	-0.50	62.40	82.10	0.0	47.50	200.60	177.10	259.50	184.60	265.30	185.90	527.00	285.00	155.00	0.00	0.00	236.50	244.50	262.50	377.70	312.50	277.10	14.70	6.50	5.80
	23	5.40	53.10	57.70	9.5	47.20	203.20	181.20	250.60	190.10	258.50	189.40	540.00	351.00	162.00	0.00	0.00	227.70	238.90	258.80	343.30	298.00	272.70	13.80	5.20	7.90
	24	9.80	43.80	49.60	30.0	61.50	191.40	180.60	233.90	184.10	239.60	184.20	615.00	391.00	167.00	0.00	0.00	208.10	215.40	236.40	292.20	266.00	251.70	7.20	6.20	5.70
	25	12.00	52.00	49.10	5.4	56.10	195.20	178.30	250.00	179.40	250.60	184.90	571.00	297.00	161.00	0.00	0.00	211.70	216.20	234.70	308.40	281.70	261.10	10.30	5.50	0.60
	26	12.20	41.40	35.60	91.9	52.10	186.00	169.00	220.40	183.20	229.60	180.20	568.00	467.00	149.00	0.00	0.00	204.50	211.40	229.00	263.90	244.90	239.40	5.80	0.00	9.20
	27	26.90	31.50	33.40	62.7	38.50	183.00	176.10	213.00	183.90	220.30	174.40	644.00	500.00	163.00	0.00	0.00	191.00	192.60	205.30	243.20	228.00	221.80	8.60	8.40	7.30
	28	22.70	34.10	48.90	96.2	38.70	183.30	178.00	220.30	185.90	227.10	174.70	657.00	467.00	167.00	0.00	0.00	191.60	193.10	206.80	253.20	234.30	222.80	8.60	7.60	6.80
	29	25.00	32.90	46.60	61.8	28.60	185.80	180.50	226.60	194.50	230.90	177.00	658.00	486.00	171.00	0.00	0.00	197.70	199.10	211.50	259.70	239.90	227.90	8.80	4.90	4.30
	30	19.60	27.30	18.20	107.7	55.40	184.30	175.60	210.80	183.50	214.20	177.70	630.00	509.00	163.00	0.00	0.00	187.20	190.20	201.90	221.10	218.10	214.50	6.60	-0.10	3.40
	31	23.80	29.40	20.10	0.5	53.50	180.10	169.60	217.00	177.70	220.40	173.20	614.00	435.00	153.00	0.00	0.00	184.70	188.60	201.00	241.30	221.40	216.10	6.90	5.70	3.40
	32	24.10	27.40	22.20	17.3	32.20	177.50	170.70	209.50	176.80	214.40	173.20	645.00	477.00	156.00	0.00	0.00	186.40	191.50	204.00	239.80	221.10	216.10	4.30	5.00	4.90

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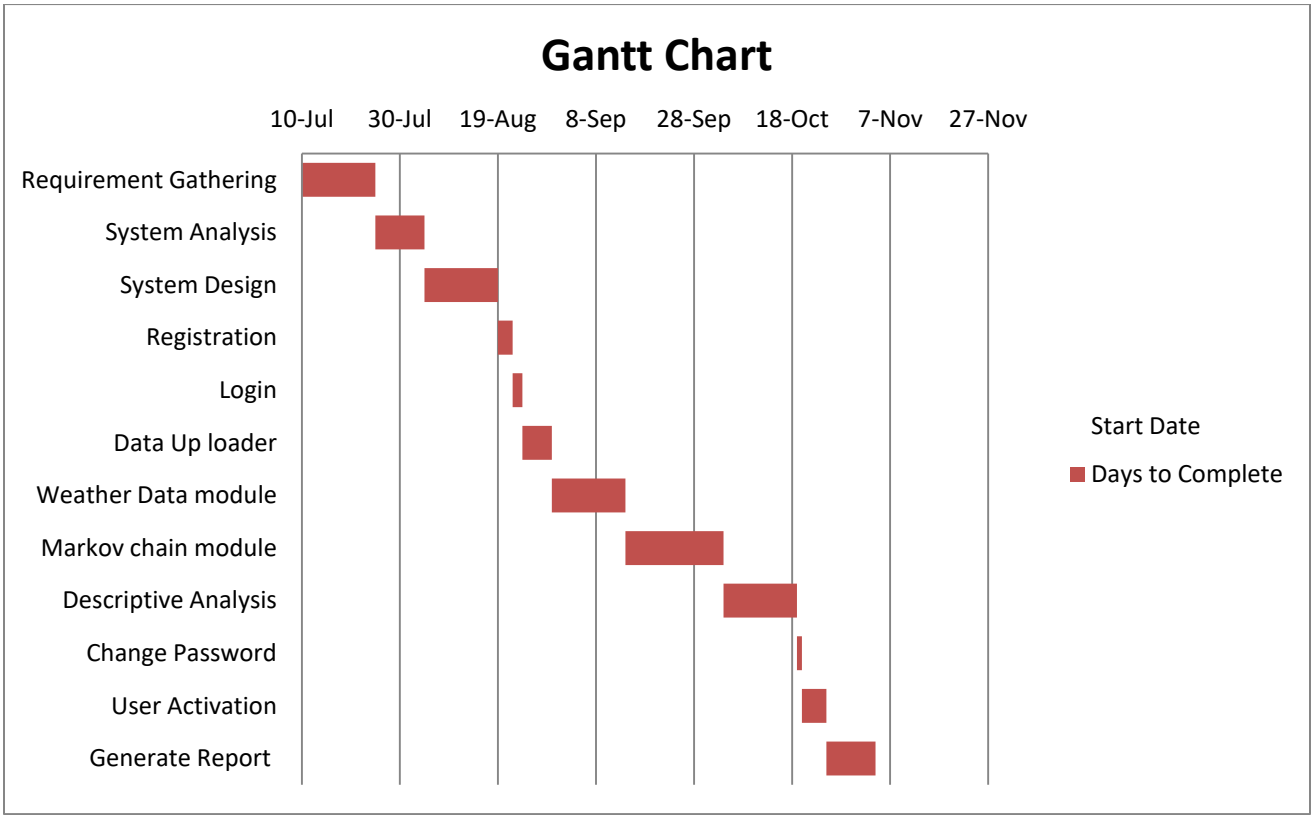
- This image in Report of weekly data.

9. Gantt Chart:

- **Process**
  - Requirement Gathering(15 days)
  - System Analysis(10 days)
  - System Design(15 days)
  - Registration(3 days)
  - Login(2 days)
  - Data Up loader(6 days)
  - Weather Data module(15 days)
  - Markov chain module(20 days)
  - Descriptive Analysis(15 days)
  - Change Password(1 days)
  - User Activation(5)
  - Generate Report(10 days)



10. Conclusion:

This System through Easily Stored metrological repository data in system and that Data Through Analysis of Markov chain and Descriptive Analysis of metrological repository data and Easily report of monthly and weekly conversation of daily data after That Analysis Through Planning of Agricultural Sector in Anand District.

11. References:

- CALIFORNIA INSTITUTE OF TECHNOLOGY, Ma 3/103 KC Border Introduction to Probability and Statistics Lecture 13: Markov Chains and Martinagles
- Introduction to Markov Chains To word Data science [https://towardsdatascience.com/introduction-to-markov-chains-50da3645a50d]
- International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 7, July 2015 Copyright to IJIRSET DOI:10.15680/IJIRSET.2015.0407199 6644 Markov Chain Model for Probability of Weekly Rainfall in Mandya District, Karnataka
- [http://www.ijirset.com/upload/2015/july/199_krishnamurthy%20int%20jul.pdf]