

PROJECT REPORT

TEAM ID:PNT2022TMID54006

**PROJECT TITLE:EXPLORATORY ANALYSIS
OF RAINFALL DATA IN INDIA FOR
AGRICULTURE**

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INTRODUCTION:

India is an agricultural country and secondary aggro-based market will be steady with a good monsoon. The economic growth of each year depends on the amount of duration of monsoon rain, bad monsoon can lead to the destruction of some crops, which may result in scarcity of some agricultural products which in turn can cause food inflation, insecurity and public unrest. In our analysis we are trying to understand the behavior of rainfall in India over the years, by months and different.

1.1 PROJECT OVERVIEW:

Rainfall has been a major concern these days. Weather conditions have been changing for time being. Rainfall forecasting is important otherwise, it may lead to many disasters. Irregular heavy rainfall may lead to the destruction of crops, heavy floods that can cause harm to human life. It is important to exactly determine the rainfall for effective use of water resources, crop productivity, and pre-planning of water structures.

This comparative study is conducted concentrating on the following aspects: modeling inputs, Visualizing the data, modeling methods, and pre-processing techniques. The results provide a comparison of various evaluation metrics of these machine learning techniques and their reliability to predict rainfall by analyzing the weather data.

We will be using classification algorithms such as Decision tree, Random forest, KNN, and xgboost. We will train and test the data with these algorithms. From this best model is selected and saved in pkl format. Once the model is saved, we integrate it with flask application and also deploy the model in IBM.

1.2 PURPOSE:

India is an agricultural country and secondary agro based market will be steady with a good monsoon. The economic growth of each year depends on the amount of duration of monsoon rain, bad monsoon can lead to destruction of some crops, which may result in scarcity of some agricultural products which in turn can cause food inflation, insecurity and public unrest. In our analysis we are trying to understand the behavior of rainfall in India over the years, by months and different subdivisions.

2.LITERATURE SURVEY:

2.1 EXISTING PROBLEM:

This study has been undertaken to examine the occurrence of climate change in India , the most state of India and its impact on rainfall pattern which is a primary constraint for agricultural production. Consequently, the season window for south-west monsoon crops has shortened while the north-east monsoon crops are left to fend against flood risk during their initial stages. Further, the incoherence in warming, climate change and rainfall impact seen across the state necessitates devising different indigenous and institutional adaptation strategies for different regions to overcome the adverse impacts of climate change on agriculture.

2.2 REFERENCES:

Journal, Research Paper, Publication & Article Title	Citation	Description

1. Machine Learning based Rainfall Prediction	Grace, R. Kingsy; Suganya, B. (2020). <i>[IEEE 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) - Coimbatore, India (2020.3.6-2020.3.7)]</i> 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) - Machine Learning based Rainfall Prediction., (), 227–229. doi:10.1109/ICACCS48705.2020.9074233	This paper explains the proposed method MLR [Multiple Linear Regression] based Rain Fall Prediction. The proposed method predicts the rainfall for the Indian dataset using multiple linear regression and provides improved results in terms of accuracy, MSE and correlation. The data for the prediction is collected from the publicly available sources and the 70 percentage of the data is for training and the 30 percentage of the data is for testing.
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2. Machine Learning Techniques For Rainfall Prediction: A Review	2017 International Conference on Innovations in information Embedded and Communication Systems (ICIIECS) - Aakash Parmar, Kinjal Mistree, Mithila Sompura - Department of Computer Engineering, CGPIT, Uka Tarsadia University, Bardoli, Surat, India	Review work and comparison of different approaches and algorithms used by researchers for rainfall prediction is shown in a tabular form. Intention of this paper is to give non- experts easy accessto the techniques and approaches used in the field of rainfall prediction.
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2.3 PROBLEM STATEMENT DEFINITION:

❖ Climate is an important aspect of human life. So, the Prediction should be accurate as much as possible. In this paper we try to deal with the prediction of the rainfall which is also a major aspect of human life and which provides the major resource of human life which is Fresh Water. Fresh water is always a crucial resource of human survival – not only for the drinking purposes but also for farming.

❖ A bad rainfall prediction can affect the agriculture mostly farmers as their whole crop is dependent on the rainfall and agriculture is always an important part of every economy. So, making an accurate prediction of the rainfall is somewhat good.

❖ Making a good prediction of climate is always a major task now a day because of the climate change.

❖ Now climate change is the biggest issue all over the world. Peoples are working on to detect the patterns in climate change as it affects the economy in production to infrastructure. So as in rainfall also making prediction of rainfall is a challenging task with a good accuracy rate. Making prediction on rainfall cannot be done by the traditional way, so scientist is using machine learning and deep learning to find out the pattern for rainfall prediction.

3.IDEATION & PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS:

Says

What have we heard them say?
What can we imagine them saying?

Change in
Climate and
intensity is
now
acknowledged

Increasing
Annual
Income for
Farmers

Precautions
Are needed

Exploratory Analysis of Rainfall Data in India for Agriculture

It is the main
cause of
poverty

Thinks

What are their wants, needs, hopes,
and dreams? What other thoughts
might influence their behavior?

Due to
pesticides
there are many
side effects to
crops

Growth and
Health of the
crops are
poor

It leads to
overall poor
growth

The
prediction is
not always
right

It is every
individual's
responsibility

Rainfall
analysis helps
at the time of
harvesting

Crops which
are hybrid
are cultivated
in large scale

Loss of
crops are
prevented

Does

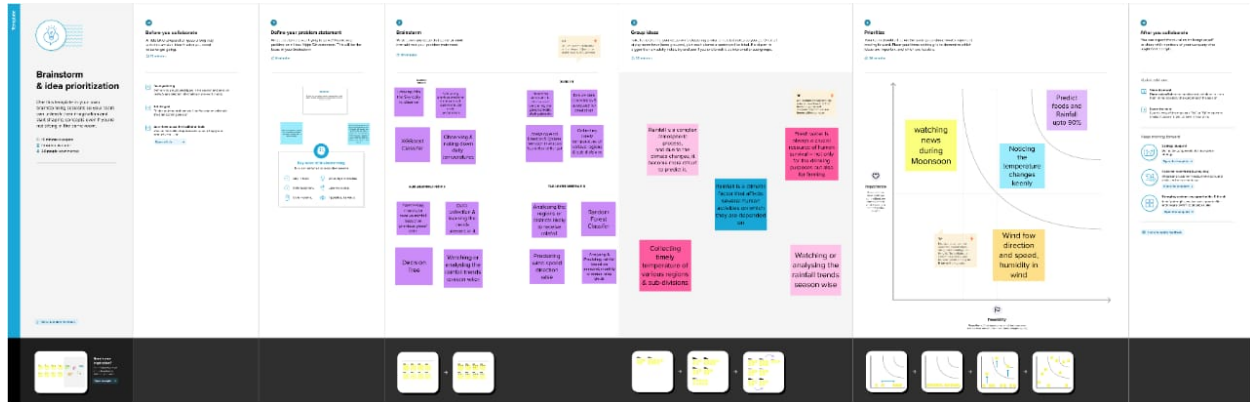
What behavior have we observed?
What can we imagine them doing?

Feels

What are their fears, frustrations, and
anxieties? What other feelings might
influence their behavior?



3.2 IDEATION & BRAINSTORMING:



3.3 PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ol style="list-style-type: none"> 1. Due to high downpour of rainfall crops may get affected and this can lead to poor growth of crops. 2. This can have a drastic effect over the farmers and they may lose their livelihood. 3. The food is also limited for people due to less production of crops and there may be a sudden increase in cost for food products. 4. Rainfall plays a major role in crop production.

2.	Idea / Solution description	<ol style="list-style-type: none"> 1. If we analyse the last few years data it will enable sufficient allocation of water resources for agricultural purposes. 2. This proper analysis of amount of rainfall helps in preventing crop damage
3.	Novelty / Uniqueness	<ol style="list-style-type: none"> 1. It is used to predict the rainfall easily 2. It also uses precipitation and other earth observing datasets in tropical cyclones. 3. It is relies upon the rainfall data in India for agriculture.
4.	Social Impact / Customer Satisfaction	<ol style="list-style-type: none"> 1. Water irrigation method is improved with the help of weather forecasting. 2. This data can assist farmers in determining when they should work most efficiently in their day-to day life. 3. Variety of crops can be cultivated to obtain good health of people
5.	Business Model (Revenue Model)	<ol style="list-style-type: none"> 1. Due to collaboration with agriculturesector, we could provide technical solutions to problems and there may be increase in crop productivity and crop growth. 2. This can help in avoiding damage and wastage of crops and could give high yield of crops to farmers.

6.	Scalability of the Solution	<ul style="list-style-type: none"> This will help the major Agriculture based company to maximize their growth efficiency, save resources and optimize their production and it will analyse the climate data from meteorological stations and from food and Agricultural organizations.
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3.4 PROBLEM SOLUTION FIT:

Project Title: Exploratory Analysis of Rain Fall Data in India for Agriculture , Project Design Phase – I : Problem Solution Fit		
1. CUSTOMER SEGMENTS CS <ul style="list-style-type: none"> Focused on Farmers, Publics Employees/Workers activities agriculture Departments of the government seeking agricultural rainfall forecasts 	6. CUSTOMER CONSTRAINTS CC <ul style="list-style-type: none"> Unable to connect Network To get a prediction with 100% accuracy Cost factors for applications with high prediction accuracy and value Time limitation 	5. AVAILABLE SOLUTIONS AS <ul style="list-style-type: none"> This project provides solution to farmers during the periods of heavy rainfall. News on weather forecasting from various communication media like radio, news channels, etc. Internet problem arises while connected weather report well planned drainage system
2. JOBS-TO-BE-DONE / PROBLEMS J&P <ul style="list-style-type: none"> Jobs to be done: Analysis from previous rainfall data Achieve correct and accurate predictions Sudden change in weather and immediate rainfall or showers 	9. PROBLEM ROOT CAUSE RC <ul style="list-style-type: none"> Unpredictable weather in various regions of India Drastic variability in climate change Biodiversity loss Poor resource management 	7. BEHAVIOUR BE <ul style="list-style-type: none"> Take suggestions from farmers and industrial aid Take decisions as per previous experiences and self-analysis
3. TRIGGERS TR <ul style="list-style-type: none"> Current losses and debts Yearly crop damage due to heavy rainfall Evolving market competition and change in demand-supply 	10. OUR SOLUTION SL <ul style="list-style-type: none"> Region [district or sub-division] based analysis of previous years' rainfall data and predict the rainfall pattern Building a low-cost application [consuming low bandwidth] to predict the rainfall of places in India with a high concentration of agricultural activities while taking care of the trends and analysis done already Significant need for an appropriate irrigation system 	8. CHANNELS of BEHAVIOUR CH <p>ONLINE</p> <ul style="list-style-type: none"> E commerce for agriculture business Expanded Customer Base <p>OFFLINE</p> <ul style="list-style-type: none"> Community forums, meeting where farmers and other people can share ideas, discuss and decide on crop activities
4. EMOTIONS: BEFORE / AFTER EM <ul style="list-style-type: none"> Before : Paying debts, incurring losses, low crop production After : Increase in crop production, making effective decisions, experiencing growth and profits 		

4.REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENT & 4.2 NON-FUNCTIONAL REQUIREMENTS:

Functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	This model can be used in all places such as remote villages, metropolitan cities etc and it can be used by all without age limit.
NFR-2	Security	The user can use the model without security issues and in addition to that the model doesn't require any personal details.
NFR-3	Reliability	With the help of a supporting device and an uninterrupted connection we can get better results.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	To import the necessary packages	Packages like NumPy, pandas should be imported
FR-2	Downloading and loading the dataset	The dataset should be downloaded and the appropriate dataset is loaded
FR-3	The data is pre-processed	The data is made suitable to build a reliable model
FR-4	Constructing the machine learning model	The best algorithm is chosen and checking the optimised result.
FR-5	The data is trained	The model is trained using the training data.
FR-6	The model is tested	To evaluate the model is tested and analysed thoroughly

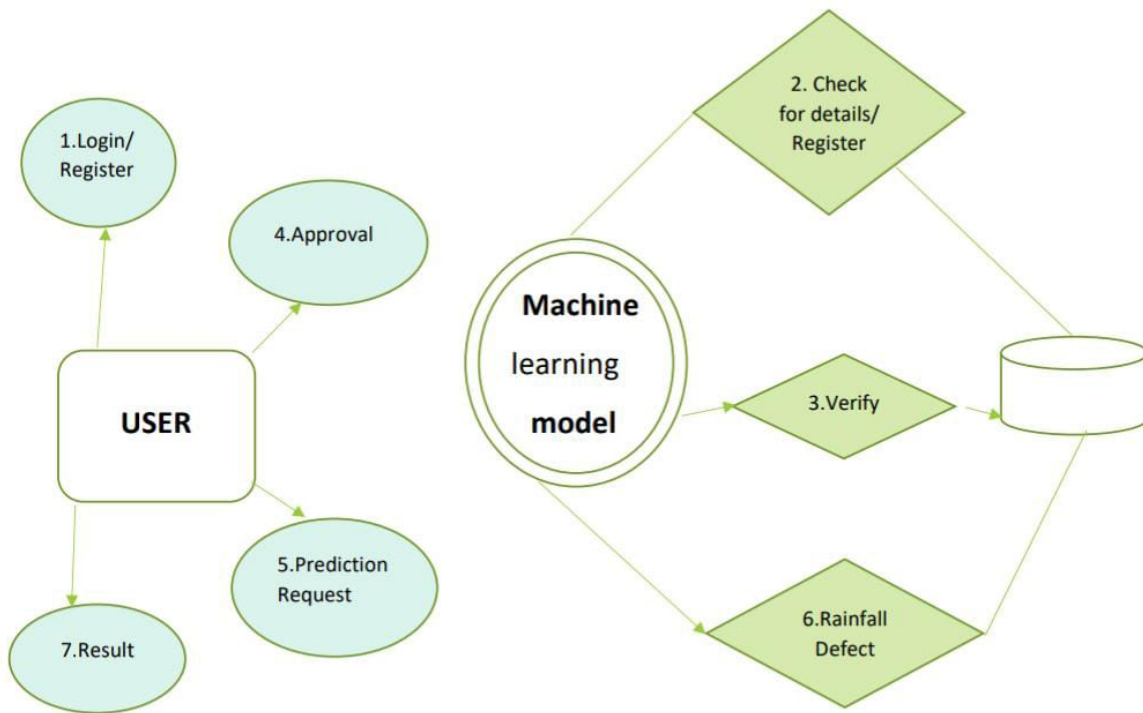
Following are the non-functional requirements of the proposed solution.

NFR-5	Availability	This model is highly available and it can be used by all age groups without any restrictions
NFR-6	Scalability	People such as farmers, greengrocers can highly benefit from this.

5. PROJECT DESIGN:

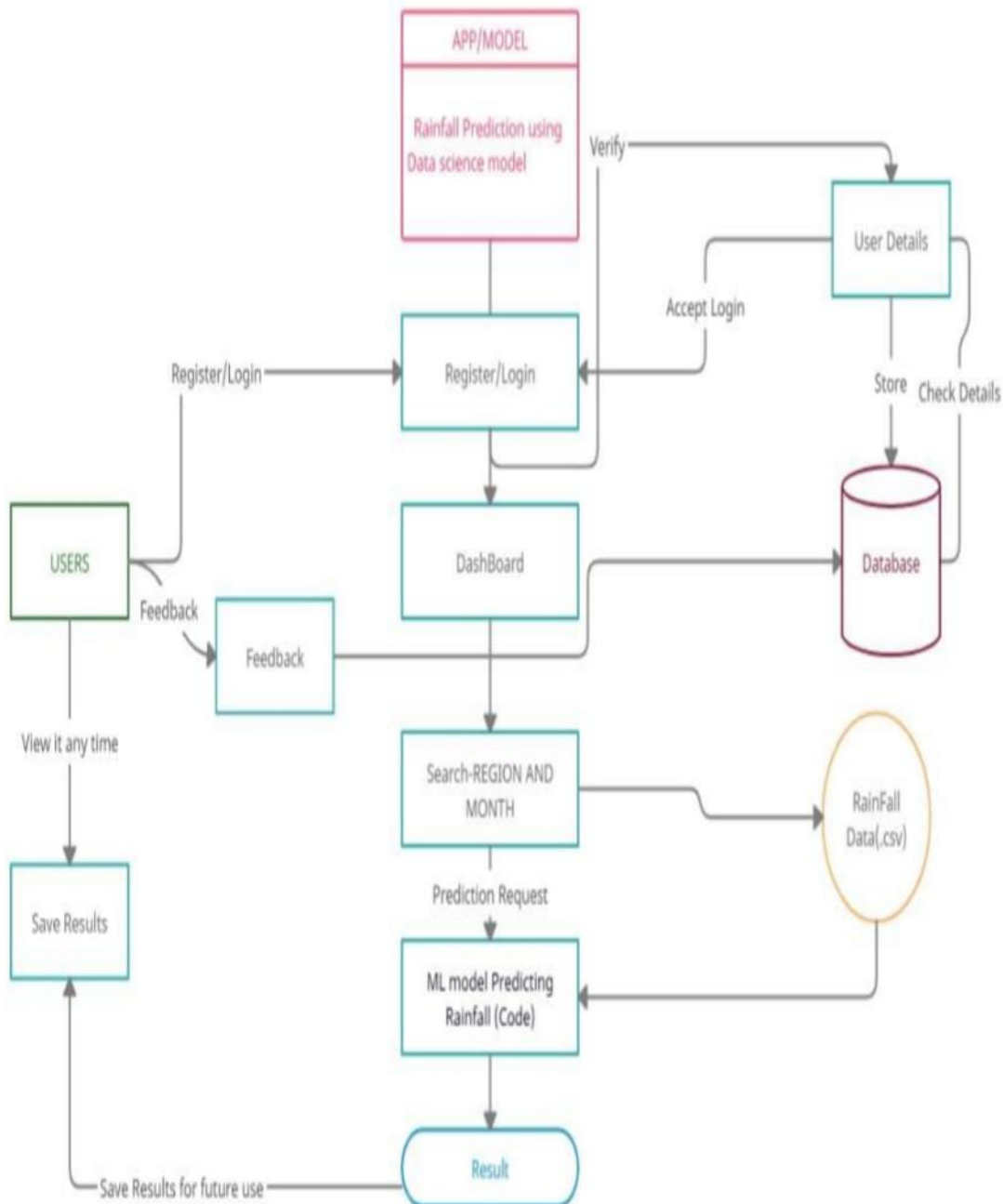
5.1 DATA FLOW DIAGRAMS:

0-LEVEL DATA FLOW DIAGRAM:

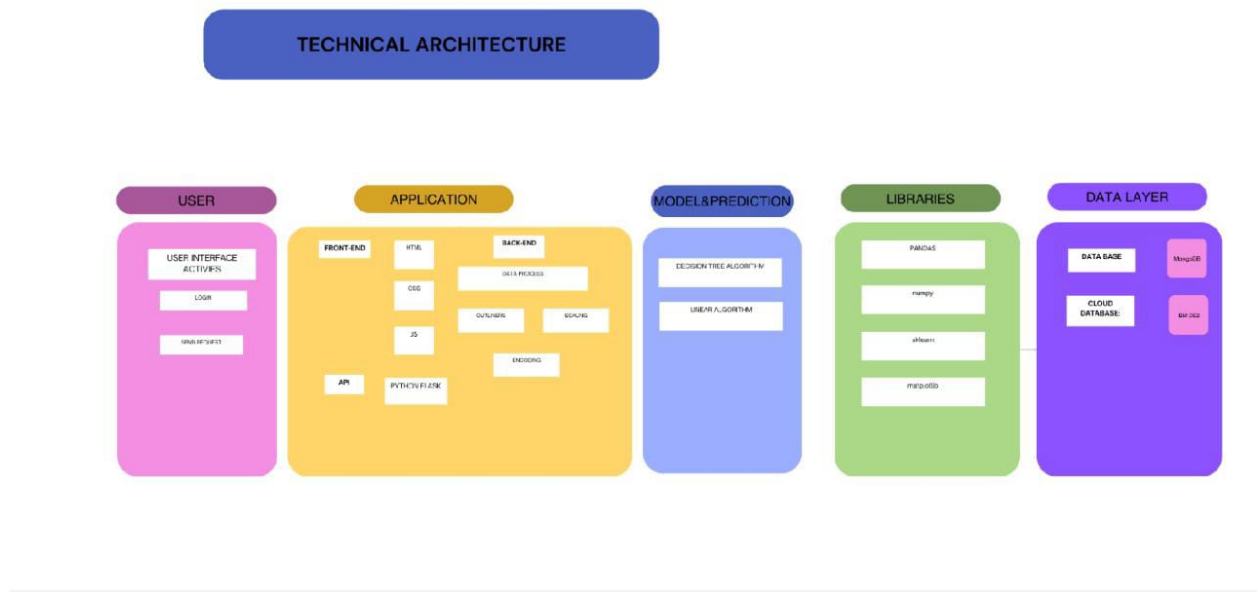


Project Design Phase-II
Data Flow Diagram & User Stories

2-LEVEL DATA FLOW DIAGRAM:



5.2 SOLUTION AND TECHNICAL ARCHITECTURE:



5.3 USER STORIES:

	Prediction	USN-7	User can view the visualization of the rainfall data for a specific region in India or for a specific time period		Medium	Sprint-2
		USN-8	User can change his/her password and can view the account details and search history	Verification will be required and new password should be entered	High	Sprint-2
		USN-9	The prediction or analysis request can be asked for the desired region for future or past events respectively		High	Sprint-2

	News	USN-10	User can give the feedback on the accuracy of the prediction and on the user interface		High	Sprint-3
Customer care Executive	Support	USN-11	Responds to user queries via telephone,email etc	Queries can be raised in situation of doubts	Medium	Sprint-3
		USN-12	The team must analyse all the queries and try to debug and make plans so that such queries wouldn't be raised again		Low	Sprint-3
		USN-13	Organize for a FAQ session where commonly asked doubts can be redressed by the team	The user will get all their doubt clarified	Low	Sprint-3
		USN-14	The team must respond immediately to the queries based on the priority	Queries should get resolved	High	Sprint-3
Core Development Team	Core function	USN-15	Design, develop the application in such a way that the best user interface and maintenance should be taken care of.	Easy and self-understandable user interface	High	Sprint-4
		USN-16	The website is responsive on all the devices and the screen sizes	User experience should be good irrespective of the devices or platforms	Medium	Sprint-4

		USN-17	The updates should be on time with the solutions of the raised queries	The existing functionalities should not be affected by the update	High	Sprint-4
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6.PROJECT PLANNING AND SCHEDULING:
6.1 SPRINT PLANNING AND ESTIMATION & 6.2 SPRINT DELIVARY SCHEDULE:

Use the below template to create product backlog and sprint schedule

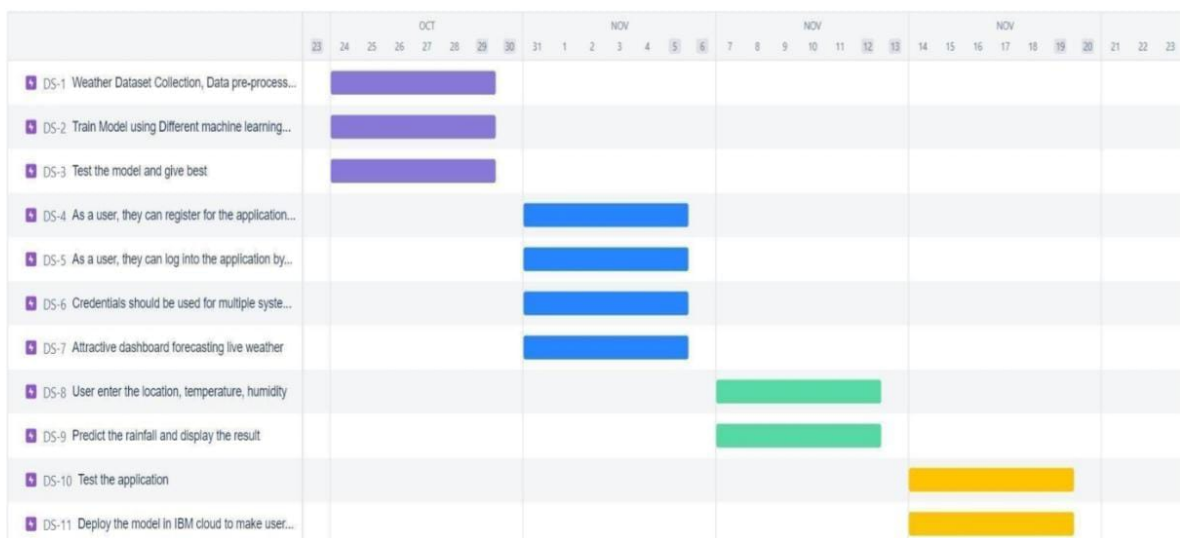
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	Rainfall Prediction ML Model (Dataset)	USN-1	Weather Dataset Collection, Data preprocessing, Data Visualization.	5	High
Sprint-1		USN-2	Train Model using Different machine learning Algorithms	5	High
Sprint-1		USN-3	Test the model and give best	10	High
Sprint-2	Registration	USN-4	As a user, they can register for the application through Gmail. Password is set up.	5	Medium
Sprint-2	Login	USN-5	As a user, they can log into the application by entering email & password	5	Medium
Sprint-2		USN-6	Credentials should be used for multiple systems and verified	4	Medium
Sprint-2	Dashboard	USN-7	Attractive dashboard forecasting live weather	6	Low
Sprint-3	Rainfall Prediction	USN-8	User enter the location, temperature, humidity	10	High
Sprint-3		USN-9	Predict the rainfall and display the result	10	High
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-4	Testing	USN-10	Test the application	10	High

Sprint-4	Deploy Model	USN-11	Deploy the model in IBM cloud to make user friendly application	10	High
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Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (Planned End)
Sprint-1	20	6 Days	31Oct 2022	05 Nov 2022	20
Sprint-2	20	6 Days	05 Nov 2022	10 Nov 2022	20
Sprint-3	20	6 Days	10 Nov 2022	15 Nov 2022	20
Sprint-4	20	6 Days	15 Nov 2022	21 Nov 2022	20

6.3 REPORT FROM JIRA:



7.CODING & SOLUTIONING:

7.1 FEATURE 1:

```

<!Doctype Html>
<Html>
<Head>
<Title>
LOGIN HERE!!
</Title>
<center><body background="rain7.jpg"></center>
<style type=text/css>
body
{
height: 125vh;
margin-top: 80px;
padding: 30px;
background-size: cover;
font-family: sans-serif;
}
</style>
</Head>
<Body>
<h1 style="color: red;">
<center> EXPLORATORY ANALYSIS OF RAIN FALL DATA IN INDIA FOR
AGRICULTURE</h1> </center>
<h2 style="color:gold;">
<center> <marquee> Today's Rain Water is Tomorrow's Weather </marquee></h2>
<Title>
LOGIN PAGE
</Title>
<center><style type=text/css>
Body {
font-family: Calibri, Helvetica, sans-serif;
font-size: 190,90;
background-image: url("rain7.jpg");
background-position: center;
background-repeat: no-repeat;
background-attachment: fixed;
background-size: cover;

```

```
}  
}  
<style>  
Body {  
  font-family: Calibri, Helvetica, sans-serif;  
  background-color: white;  
}  
button {  
  background-color: dimgray;  
  width: 100%;  
  color: white;  
  padding: 15px;  
  margin: 10px 18px;  
  border: white;  
  cursor: pointer;  
}  
form {  
  border: 3px solid #f1f1f1;  
padding: 10px 18px;  
  width: 50%;  
  margin-left: 25%;  
  margin-right: 25%;  
}  
input[type=text], input[type=password] {  
  width: auto;  
  margin: 8px 0;  
  padding: 10px 18px;  
  display: inline-block;  
  border: 2px red;  
  box-sizing: border-box;  
}  
button:hover {  
padding: 10px 18px;  
  width: 50%;  
  margin-left: 25%;  
  margin-right: 25%;  
}
```

```

.subbtn
{
    padding: 10px 18px;
    width:50%;
    margin-left:25%;
    margin-right:25%;
}
.cancelbtn {
    padding: 10px 18px;
    width:50%;
    margin-left:25%;
    margin-right:25%;
}
.regbtn {
    padding: 10px 18px;
    width:50%;
    margin-left:25%;
    margin-right:25%;
}
}
.container {
    padding: 25px;
    background-image: url("rain7.jpg");
background-position: center;
background-repeat: no-repeat;
background-attachment: fixed;
background-size: cover;
}
</style>
</head>  <center><body background="rain7.jpeg"></center>
<center><style type=text/css>
Body {
    font-family: Calibri, Helvetica, sans-serif;
font-size: 1000,1000;
}
}
<style>

```

```

</style>
</head>
<body>
  <center> <h1> LOGIN FORM </h1> </center>
  <form style="margin: auto; width: 220px;">
    <div class="container">
      <h3> <label>Username : </label>
      <input type="text" name="username" required><br>
      <label>Password : </label> <h3>
      <input type="password" name="password" required> <br>

  <button type="button" class="subbtn" id="login">Login</button>
  <a href="ibmregister.html">
  <a href="./ibmregister.html"><button type="button"
  class="regbtn" id="register">Register</button></a>
  <button type="button" class="cancelbtn"> Cancel</button>
  <br>
    <h5 style="color:red;">
    <a href="#"> Need Help in Login? </a>
  </div>
  </form>
</body>
</html>
</p>
</Body>
</Html>

```

[register.html:](#)

```

<!DOCTYPE html>
<html>
<head>
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <title> REGISTER HERE!!</title>
  <center><body background="rain7.jpg"></center>

```

```
<center><style type=text/css>
Body {
  font-family: Calibri, Helvetica, sans-serif;
  font-size: 30,90;

  background-image: url("rain7.jpg");
  background-position: center;
  background-repeat: no-repeat;
  background-attachment: fixed;
  background-size: cover;
}
}
</style>
```

```
Body {
  font-family: Calibri, Helvetica, sans-serif;
  background-color: mediumturquoise;
}
button {
  background-color: dimgray;
  width: 100%;
  color: white;
  padding: 15px;
  margin: 10px 10px;
  border: none;
  cursor: pointer;
}
form {
  border: 3px solid #f1f1f1;
padding: 10px 18px;
  width:50%;
  margin-left:25%;
  margin-right:25%;
}
input[type=text], input[type=password] {
  width: auto;
  margin: 8px 0;
```



```
padding: 12px 20px;
display: inline-block;
border: 2px black;
box-sizing: border-box;
}
button:hover {
padding: 10px 18px;
width:50%;
margin-left:25%;
margin-right:25%;
}
.regbtn
{
padding: 10px 18px;
width:50%;
margin-left:25%;
margin-right:25%;
}

.cancelbtn {
padding: 10px 18px;
width:50%;
margin-left:25%;
margin-right:25%;
}
}

.container {
padding: 25px;
background-image: url("rain7.jpg");
background-position: center;
background-repeat: no-repeat;
background-attachment: fixed;
background-size: cover;
}
</style>
</head>
```

```

<body>
<div class="container">
  <h1>REGISTER FORM</h1>
  <form style="margin: auto; width: 220px;">
    <h3> <label>Username : </label>
    <input type="text" name="username" required size="15"><br>
    <label>Email : </label>
<input type="email" name="Email" required size="20"> <br>
<label>

<label>Password : </label>
  <input type="password" name="password" required size="15"> <br>
  <label>Confirm Password : </label>
  <input type="password" name="password" required size="15"> <br> <h3>
<a href="#"><button type="button" class="regbtn" id="reg">Register</button></a>
<h4><a href="ibmlogin.html"> Back to Login </a>
  </form>
</div>
</body>
</html>

```

[index.html:](#)

```

<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <title>Weather Dashboard!!</title>
  <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/css/bootstrap.min.css"
  integrity="sha384-
Vkoo8x4CGsO3+Hhxv8T/Q5PaXtkKtu6ug5TOeNV6gBiFeWPGFN9MuhOf23Q9Ifjh"
crossorigin="anonymous">

```

```

    <script src="https://kit.fontawesome.com/958828ca48.js"
crossorigin="anonymous"></script>
    <link rel="stylesheet" href="style.css">
</head>

<body>
    <!--Nav Bar-->
    <nav class="navbar navbar-dark justify-content-center myNav">
        <span class="navbar-brand mb-0 h1 navSpan">WEATHER DASHBOARD</span>
    </nav>
    <!--Main container of page-->
    <main class="container col-12">
        <section class="row">

            <!--List div-->
            <div class="col-lg-3 col-md-12 listDiv">
                <div id="1Day row searchLabel">
                    <label for="one-day-input ">Search for a City</label>
                </div>
                <form class="row">
                    <input type="text" id="city-input" class="col-7 offset-1 "><br>
                    <button id="add-city" type="submit" value="" class="col-2 searchButton"><i
                        class="fas fa-search"></i></button>
                </form>
                <div id="OneDayWeather"></div>
                <ul class="list" style="list-style-type:none;" > </ul>
            </div>

            <!--Weather div-->
            <div class="col-lg-9 col-md-12 weatherDiv">

                <!--1 Day forecast div-->
                <div class="row" id="dayForecast"></div>

                <!--Heading div-->
                <div class='row'>
                    <h4 class="forecast">5 Day Forecast:</h4>

```

```

</div>

<!--5 Day weather row-->
<div class="row">
  <div class="col-lg-2 ml-4 fiveDay col-md-10 offset-md-2"
id="nextDay"></div>
  <div class="col-lg-2 ml-4 fiveDay col-md-10 offset-md-2" id="dayTwo"></div>
  <div class="col-lg-2 ml-4 fiveDay col-md-10 offset-md-2"
id="dayThree"></div>
  <div class="col-lg-2 ml-4 fiveDay col-md-10 offset-md-2"
id="dayFour"></div>
  <div class="col-lg-2 ml-4 fiveDay col-md-10 offset-md-2" id="dayFive"></div>
</div>
</div>
</section>
</main>

<!--Scripts-->
<script src="https://code.jquery.com/jquery-3.4.1.min.js"></script>
<script
src="https://cdnjs.cloudflare.com/ajax/libs/moment.js/2.24.0/moment.min.js"></scrip
t>
<script src="javascript.js"></script>
</body>
</html>

```

style
style.css:

```

.myNav {
  background-color: #343A41;
}

.navSpan {
  font-size: 35px;
}

```

```
.weatherDiv {  
    background-color: #FFFFFF  
}
```

```
.fiveDay {  
    border: solid;  
    border-color: #0060ff;  
    border-width: 2px;  
    margin: 10px 5px;  
    padding: 4px;  
    background-color: #007AFA;  
    color: white;  
    border-radius: 5px;  
}
```

```
main {  
    background-color: #F8F9FA;  
}
```

```
#dayForecast {  
    border-color: #F4F4F4;  
    border: solid;  
    border-width: 1px;  
    background-color: white;  
    padding: 10px;  
    margin: 15px;  
}
```

```
.bigger {  
    font-size: 25px;  
    font-weight: bold;  
}
```

```
.head {  
    font-weight: bold;  
    font-size: 20px;  
    padding: 2px 2px 5px 5px;
```

```
    margin-bottom: 10px;
}
```

```
.fa-sun {
    color: #FFAB4D !important;
}
```

```
.fa-cloud-rain {
    color: #47abf7 !important;
}
```

```
.fa-cloud {
    color: rgb(223, 213, 213);
}
```

```
.fa-smog {
    color: lightgrey;
}
```

```
.fas, .far {
    padding-left: 30px;
    padding-bottom: 10px;
}
```

```
.forecast {
    margin-left: 10px;
    ;
}
```

```
.UvIndex, .windSpeed, .humidity, .tempClass {
    margin-bottom: 10px;
    padding: 5px;
    font-size: 16px;
}
```

```
.searchButton {
    background-color: #007CFF;
```

```
    border-radius: 10px;
}
```

```
.searchButton :hover :active {
    border: solid;
    border-width: 3px;
    border-color: black;
}
```

```
label {
    font-size: 18px;
    font-weight: bold;
}
```

```
.list {
    background-color: #FFFFFF;
    margin: 10px 5px;
}
```

```
li {
    border-bottom: solid;
    border-color: rgb(240, 238, 238);
    border-width: .5px;
    margin-left: -40px;
    padding: 10px 15px;
}
```

```
li:hover {
    border: solid;
    border-color: black;
    border-width: 2px;
}
```

```
.fa-search {
    color: white;
    text-align: center;
    width: 100%;
}
```

```
    position: relative;
}
```

```
.fa-search::before {
    position: absolute;
    left: 20%;
}
```

```
.low {
    color: white;
    background-color: green;
    padding: 7.5px;
    border-radius: 3px;
}
```

```
.high {
    color: white;
    background-color: red;
    padding: 5px;
}
```

```
.medium {
    color: white;
    background-color: #fbc02d;
    padding: 5px;
    border-radius: 1.5px;
}
```

```
.icon {
    background-color: white;
}
```




WEATHER MADE —SIMPLE—

Enter Location Name





WEATHER MADE —SIMPLE—

Coimbatore



Coimbatore



Coimbatore, IN



29°C

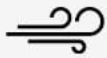
Haze



11:49



23:25



14.8
km/h



39%



0mm



29°C

Haze



11:49



23:25



14.8

km/h



39%



0mm

Sat 23:00



27°C

Clouds



0mm



48%



9.3 km/h

Sun 02:00



23°C

Clouds



0mm



58%



6.0 km/h



10.ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- Knowing when to water, as well as how much to water, is skill backed by years of experienced for farmers. Too much watering could drown the crops, especially if there has been rainfall. However, a combination of not enough watering and no rainfall could also lead to dying crops.
- Underwatering “starves” the plant of water, which can lead to crop death or low yield. Conversely, overwatering can lead to browned tips of crop leaves and also possible root rot and other issues.
- If crops are too wet, they could also start to mold or catch a fungus. The soil can also start to collect bacteria, mold, and fungus, which can then be absorbed by the plant. While this isn’t as common in crops as it is in indoor plants, poor drainage and irrigation systems can lead to these types of growths taking control over your crops.
- Along with mold or a fungus, disease can also spread amongst your crops. Rainfall is also a good indicator of predicting common crop disease, as it can affect the spread of disease. Rain can spread pathogens, pests, and other diseases to plants, leading to massive diseased crops. This could affect its yield or cause the entire field to become

unusable.

- Soil is also greatly affected by rainfall. If it is too wet or too dry, nutrients in the soil can run off and not make it to the plants' roots, leading to poor growth and overall health. Additionally, as mentioned previously, overwatering or too much rain can also lead to bacteria, fungus, and mold growth in the soil.
- Knowing when to water, preventing disease and mold, and making sure the soil is kept at the right moisture level are all components of the overall goal of the crops and their farmers: to have the highest crop yield possible. The right amount of rainfall can balance out these factors, which can lead to healthier, larger crops that can be harvested more fully.

DISADVANTAGES:

- A major portion of the country's crop area is completely dependent on Monsoon rains as they're not equipped with methods of manual irrigation. Simply speaking, the Indian economy gains due to good Monsoon rains in the country. On the other hand, weak Monsoon rains result in crop failure which affects the economy in a negative manner due to

lower production. Later on, this translates into price-rise, low industrial output, and other issues.

- Normal Monsoon rains keep a check on food inflation due to the availability of food produce. However, in a situation of drought, prices soar significantly. Not only do the prices increase drastically but the cost of living also tends to reach a new high. Also, if poor Monsoon results in less crop output, the country may even need to import.
- More than anything else, the failure of Monsoon has a huge impact on the life of the Indian farmer. Most Indian farmers rely on good crop produce during Monsoon to earn their living and in order to overcome debts incurred. Crop failure and/or deficient rainfall is one big reason for mass farmer suicides across the country. This further cements the importance of Monsoon in an agrarian economy like India.
- Lastly, agriculture isn't the only sector which is affected by the performance of Monsoon. In fact, as many as a dozen sectors depend on Monsoon, either directly or indirectly. Thus it is safe to say that Monsoon does play a big role in India. The agricultural output of rain-fed crop areas in the country has social, political, as well as economic implications.

11.Conclusion:

The average annual rainfall of region during 1999-2018 is 1051. mm. and south west monsoon rainfall 925.9 mm observed. The maximum annual rainfall recoded 1633 mm in year 2008 and low-est rainfall recoded 533 mm in year 2001. The maximum South west rainfall recoded 1564 mm in year 2008 and lowest rainfall re-coded 439 mm in year 2001. The south west monsoon plays a vital role in rainfall for water cycle. It contributes the highest percentage of rainfall and kharif season crops are most of independent on rain-fall.

The annual rainfall in year 2007 showing the highest positive rainfall anomaly (2.31) while the other years show rainfall below normal with 2009 Showing the lowest negative rainfall deviation (-2.03). and the South west (1999 to 2018) rainfall of Haridwar District in year 2018 showing the highest positive rainfall anomaly (2.15) while the other years show rainfall below normal with 2009 Showing the lowest negative rainfall deviation (-2.05). The R2 value -1.408 means that only -140.8 percent variations is observed in twenty years. The coefficient of skewness has been computed as -0.15 for annual rainfall indicates a negative trend or going to de-cline pattern but in South west rainfall of coefficient of skewness has been computed as 0.24 for annual rainfall indicated a positive trend to increasing pattern.

In future, expected annual rainfall may be less in year 2030 observed 1025 mm in the District. The south west rainfall in the year 2030; expected rainfall may be 922.8 mm. The trends are showing

increasing trend pattern from year 2019 to 2030. The trend analysis gives the scenario of current to expected future situation. Water is a vital component for agricultural crops and in abnormal period crops are irrigated by available source viz. tube well, submersible, canal, irrigation channels and other sources. The statistical analysis of annual and south west rainfall of the study area will help to better water management. Today rainfall is not regular fashion so farmers are not more dependent much more on rainfall. The source of irrigation, mechanization and knowledge of current situation of weather and climate change related pattern and adaptation of technology is maintain to crops yield trend.

12.FUTURE SCOPE:

Crop planning for stability in production:

To reduce risk of crop failure on climatic part, so as to get stabilized yields even under weather adversity, suitable crops/cropping patterns/contingent cropping planning can be selected by considering water requirements of crop, effective, rainfall and available soil moisture.

Crop management:

Management of crop involves various farm operations such as, sowing fertilizer application. Pest protection, irrigation scheduling, harvesting etc. can be carried out on the basis of specially tailored weather support. For this the use of operational forecasts, available from agro met advisories, is made e.g. 1) Weeding harrowing, mulching etc are undertaken during

dry spells forecasted.

2) Fertilizer application is advisable when rainfall is not heavy wind speed is <30 km/hr and soil moisture is between 30 to 80%

3) Spraying/dusting is undertaken when there is no rainfall, soil moisture is 90% and wind speed is <25 km/hr.

Crop Monitoring:

To check crop health and growth performance of a crop, suitable meteorological tools such as crop growth models. Water balance technique or remote sensing etc. Can be used.

Crop modeling and yield –climate relationship:

Suitable crop models, devised for the purpose can provide information or predict the results about the growth and yield when the current and past weather data is used. Research in crop –climate relationship:

Agro-meteorology can help to understand crop-climate relationship so as to resolve complexities of plant process in relation to its micro climate.

Climate extremities:

Climatic extremities such as frost floods, droughts, hail storms, high winds can be forecasted and crop can be protected.

Climate as a tool to diagnose soil moisture stress:

Soil moisture can be exactly determined from climatic water balance method, Which is used to diagnose the soil moisture stress, drought and necessary protective measures such as irrigation, mulching application of antitranspirant, defoliation, thinning etc. can be undertaken.

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PROJECT DEMO LINK:

https://drive.google.com/file/d/1CnLT95CI_0M7JMYEDie1TuRrJc7rA10a/view?usp=drivesdk

