ESTIMATE THE CROP YIELD

USING DATA ANALYTICS

PROJECT REPORT

Submitted by

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BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

TEAM ID:PNT2022TMID14409

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1.INTRODUCTION

1.1 PROCJECT OVERVIEW:

Predicting crop yields is one of the most difficult problems in agriculture. It is crucial to decision-making at the international, regional, and local levels. Agricultural, soil, climatic, environmental, and other characteristics are used to predict crop yield.

The use of technology in agriculture has increased in recent years and data analytics is one such trend that has penetrated into the agriculture field. To reach desired crop yield goals has become a difficult undertaking in agriculture

1.2 PURPOSE

Estimation of Crop yield has become the need of the hour and one easy

tool/method that can be used is Data Analytics. The term "data analytics" describes the methods used to analyze data in order toincrease productivity and financial gain. In order to examine different behavioural patterns, data is extracted from a variety of sources, cleaned up, and classified. The methods and resources employed change depending on the group or person.

The purpose behind this project is to understand the variation incrop yield due to various parameters that can be natural or non-natural.

2.LITERATURE SURVEY

2.1 EXISTING SYSTEM

. Most often, crop plants are sensitiveto stresses since they were mostly selected for high yield, and not for stress tolerance. The four most important factors that influence crop yield are soil fertility, availability of water, climate, and diseases or pests.

With such varying parameters, to understand or estimate the patterns with no technological involvements is very difficult. Thus, a solution that is technological and cater to the alterations and provide the predicted solution in a form that can be easily understood by end customers is essential

2.2 REFERENCES

i. How data analytics is transforming agriculture - ScienceDirect - https://doi.org/10.1016/j.bushor.2017.09.011

ii. https://www.researchgate.net/publication/329467349_Agriculture_Data_Analytics_in_Crop_Yield_Estimation_A_Critical_Review

iii. https://www.researchgate.net/publication/359131334_Data_analytics_platforms_for_agricultural_systems_A_systematic_literature_review

iv. N. Chergui, M. -T. Kechadi and M. McDonnell, "The Impact of Data Analytics in Digital Agriculture: A Review," 2020 International Multi-Conference on: "Organization of Knowledge and Advanced Technologies" (OCTA), 2020, pp. 1-13, doi: 10.1109/OCTA49274.2020.9151851.

v. D. Elavarasan and P. M. D. Vincent, "Crop Yield Prediction Using Deep Reinforcement Learning Model for Sustainable Agrarian Applications," in IEEE Access, vol. 8, pp. 86886-86901, 2020, doi: 10.1109/ACCESS.2020.2992480.

2.3 PROBLEM STATEMENT DEFINITIONS

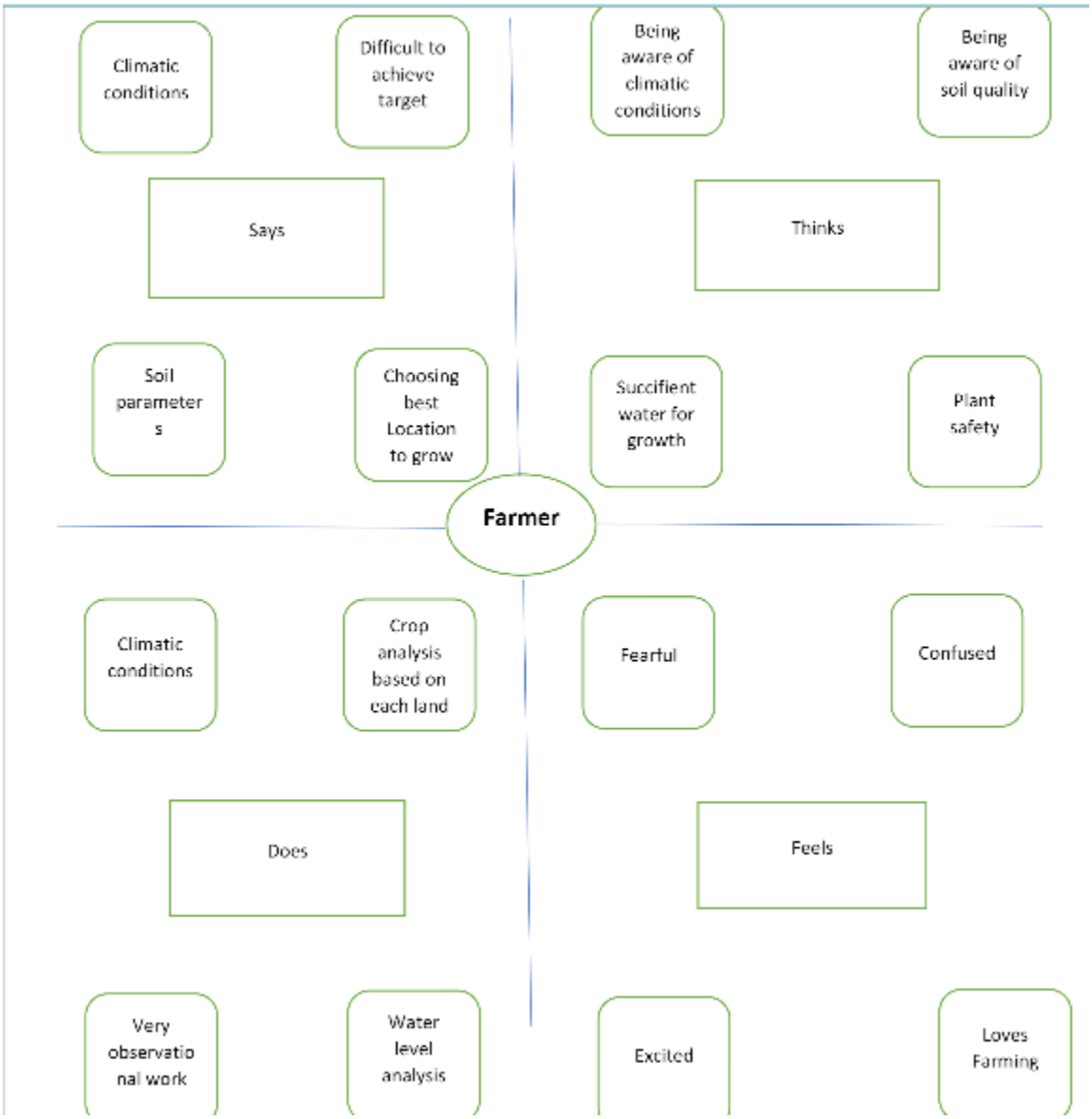
If you clearly define your problem statement and intend to collect the data needed to solve the problem yourself, you could design your data collection methods to perfectly align to your question.

1. Ram is a farmer who needs a way to understand and predict climatic conditions because he can decide on the safety measures to be followed with regards to the field setup.
2. Raj is a farmer who needs a way to decide what to grow and when to grow because he is uncertain of his environmental conditions.

3.IDEATION&PROPOSED SOLUTION

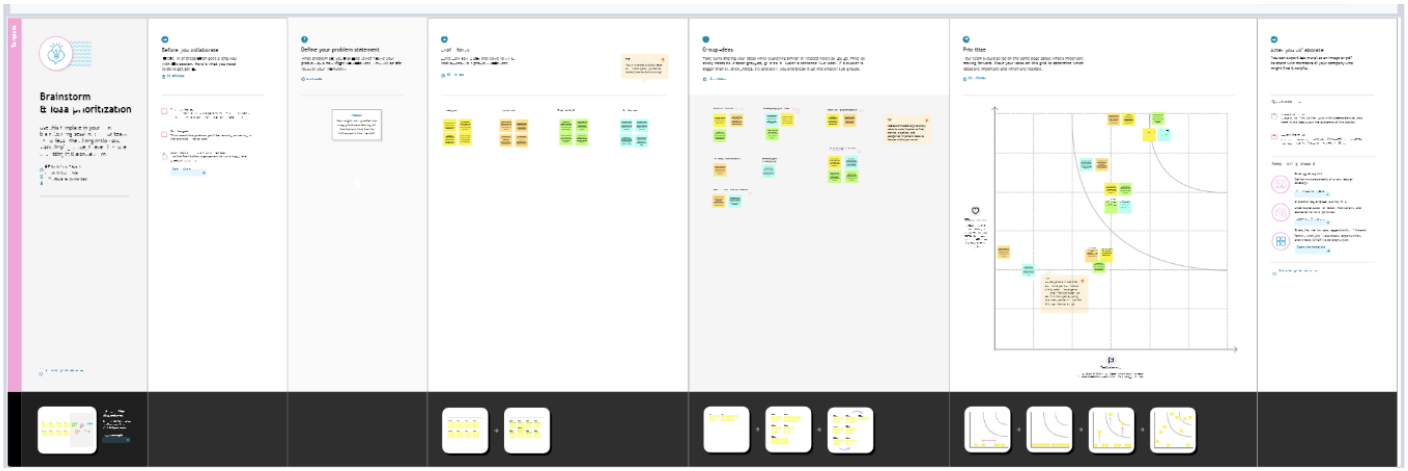
3.1 EMPATHY MAP CANVAS

An empathy map helps you identify with a customer's thoughts, feelings, and behaviors. Product teams often use empathy mapping to improve the user experience. In this article, learn how to build an empathy map and use it to improve your business strategy.



3.2 IDEATION & BRAINSTROMING

STEP-1:TEAMGATHERING,COLLEBRATIONANDSELECTTHEPROBLEMSTATMENT


Brainstorm
& Idea prioritization

3.3 PROPOSED SOLUTION

A farmer should predict climatic conditions, decide what to grow & when to grow, should know the overall crop yield turnover and must be able to be sure of the crop yield.

Inspite of the environmental and other parameters. Analysis of important visualization using the previous years' data, creating a dashboard andby going the datasets to obtain most of the insights of Crop productionin India is chosen and proposed as the solution

Availability to all the farmers who need help and as this is a simple approach, understanding issues will not arise. A profit can be made by promoting the solution as an easily available mobile application for anyone to access and benefit out of it.

There isno issue with regards to storage of datasets and collection of data. Hence, the solution can be easily scaled to handle data needs, traffic and increased number of users

3.4 PROBLEM SOLUTIONS FIT

Problem Solution Fit Document:

CUSTOMER SEGMENT(CS)

1.) Who is our customers?
The Farmers who work in the fields and yield corps and Individuals associated with agricultural activities, cultivations, harvest and sales of the harvested goods.

JOBS-TO-BE-DONE/PROBLEMS

- Helps them to understand the usage of prediction and software for better results in agriculture
- Data is to be collected and awareness should be brought in order to orchestrate the above mentioned.

TRIGGERS:

Seeing their neighbour farmers have better yield by usage of natural or non-natural means

4. REQUIREMENT ANALYSIS

4.1 FUNCTION REQUIREMENT

Functional requirements:

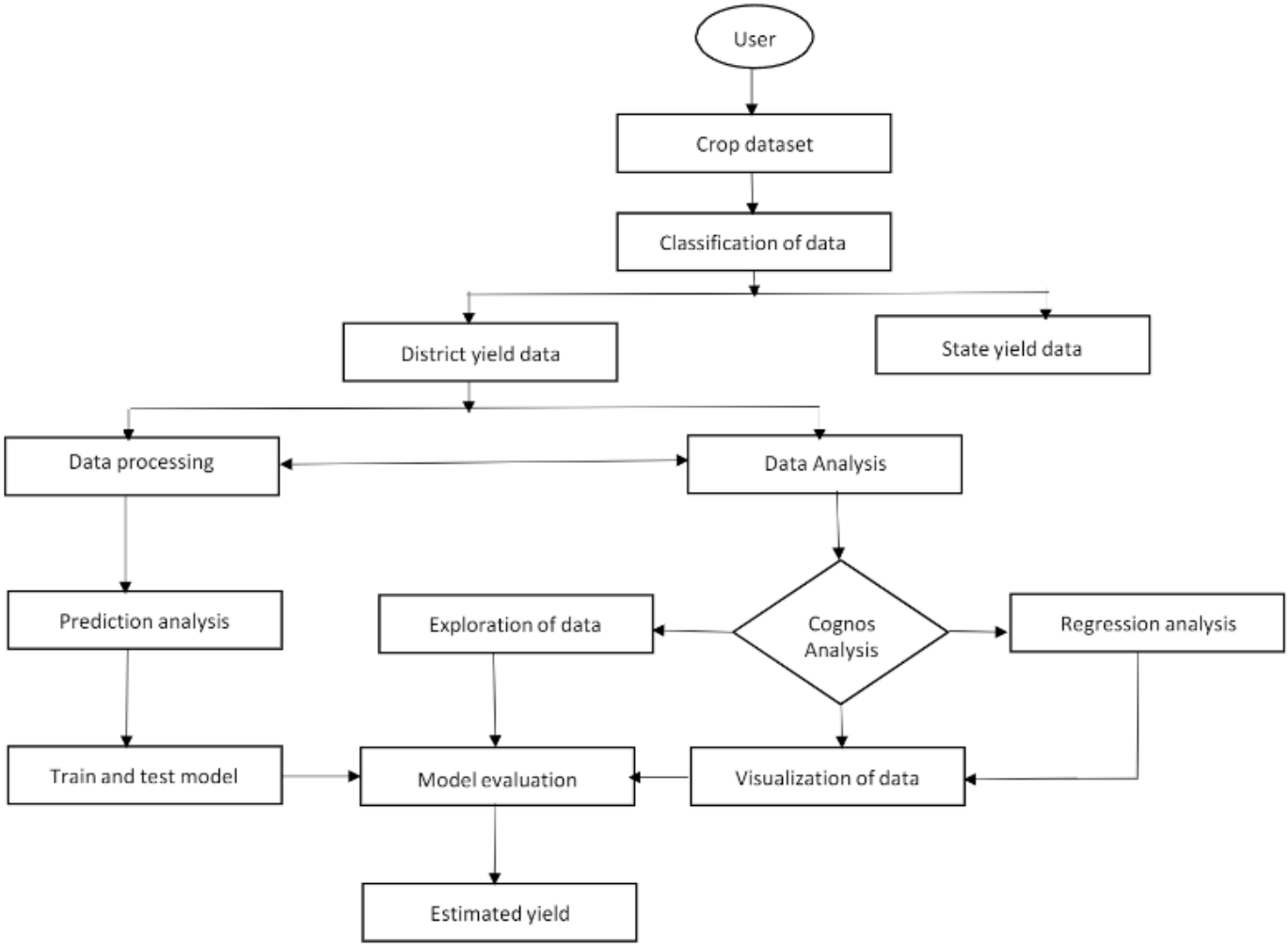
Functional requirement	Description
Registration	Registers a new user through registration form
Google authentication	New user can get added even by using a google account
Login	Lets the registered user to login to the portal
Take in the required data	This takes in the required data from the user
Estimation	A prediction of crop yield is done based on the current data
Analysis	An analysis is done on the given data to gain useful insights

Non-functional requirements:

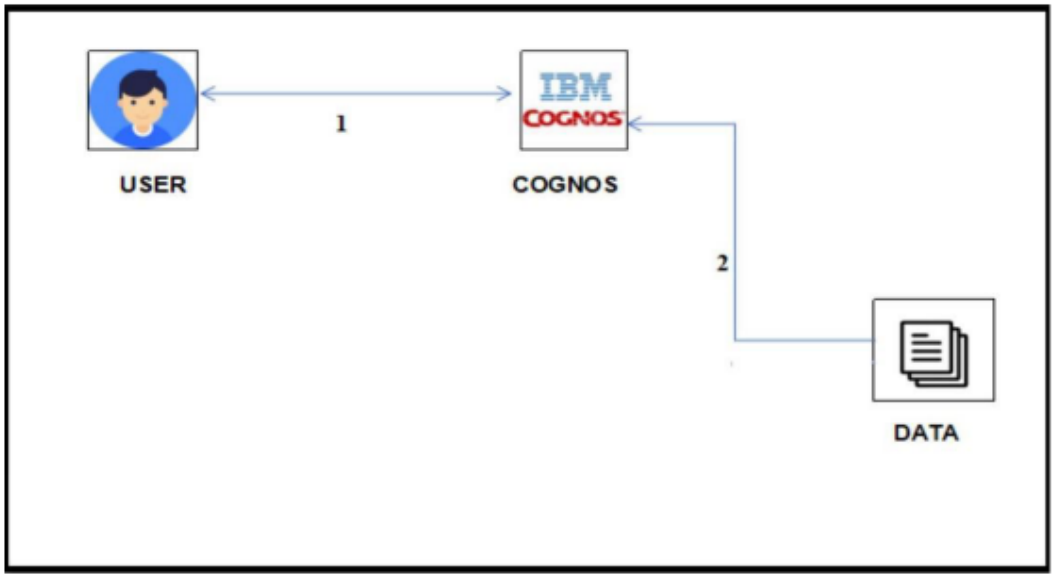
Non-functional requirement	Description
Performance	The software should provide us good performance
Reliability File display	The UI should be user friendly and easily understandable
Availability	It should be available for access at any time from anywhere
Scalability	The software should be flexible and other developers must be able to improve its capabilities

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS


User
Crop dataset
Classification of data
District yield data
State yield data
Data processing
Data Analysis
Prediction analysis
Exploration of data
Cognos Analysis
Regression analysis
Train and test model
Model evaluation
Visualization of data
Estimated yield

5.2 SOLUTION & TECHNICAL ARCHITECTUES



Is the system robust?
Yes, the software that is being developed for data analysis is robust

Is it highly modifiable?
Yes, the system is user friendly and ready for developers to make changes and enhance it

Is it scalable?
Yes, the system can be scaled up when there is a need and is flexible.

Is it buildable?
Yes, it is feasible to build at a low budget.

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Kiran Deepak
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Tharun Prasanth
Sprint-2		USN-3	As a user, I can register for the application through Google	2	Low	Deepak Tharun
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Low	Kiran Prasant
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Kiran Tharun
Sprint- 3	Dashboard	USN-6	As a user, I can freely use my dashboard and explore the features	2	High	Tharun Prasanth
Sprint- 2		USN-7	As a user, I can use the credentials to access the resources of my application	2	High	Kiran Tharun
Sprint- 3		USN-8	Performance of Data manipulations on the application	1	High	Kiran Deepak
Sprint- 3	Visualizations	USN-9	I can create dashboards with particular datasets	2	High	Deepak Tharun
Sprint- 4		USN-10	Predictive analysis can be done	1	High	Tharun Prasanth
Sprint- 3		USN-11	I can create stories with particular datasets	2	High	Kiran Prasant
Sprint- 4		USN-12	I can deliver and export reports according to the dashboards and stories created	2	High	Tharun Prasanth

6.2 SPRINT DELIVERY SCHEDULE

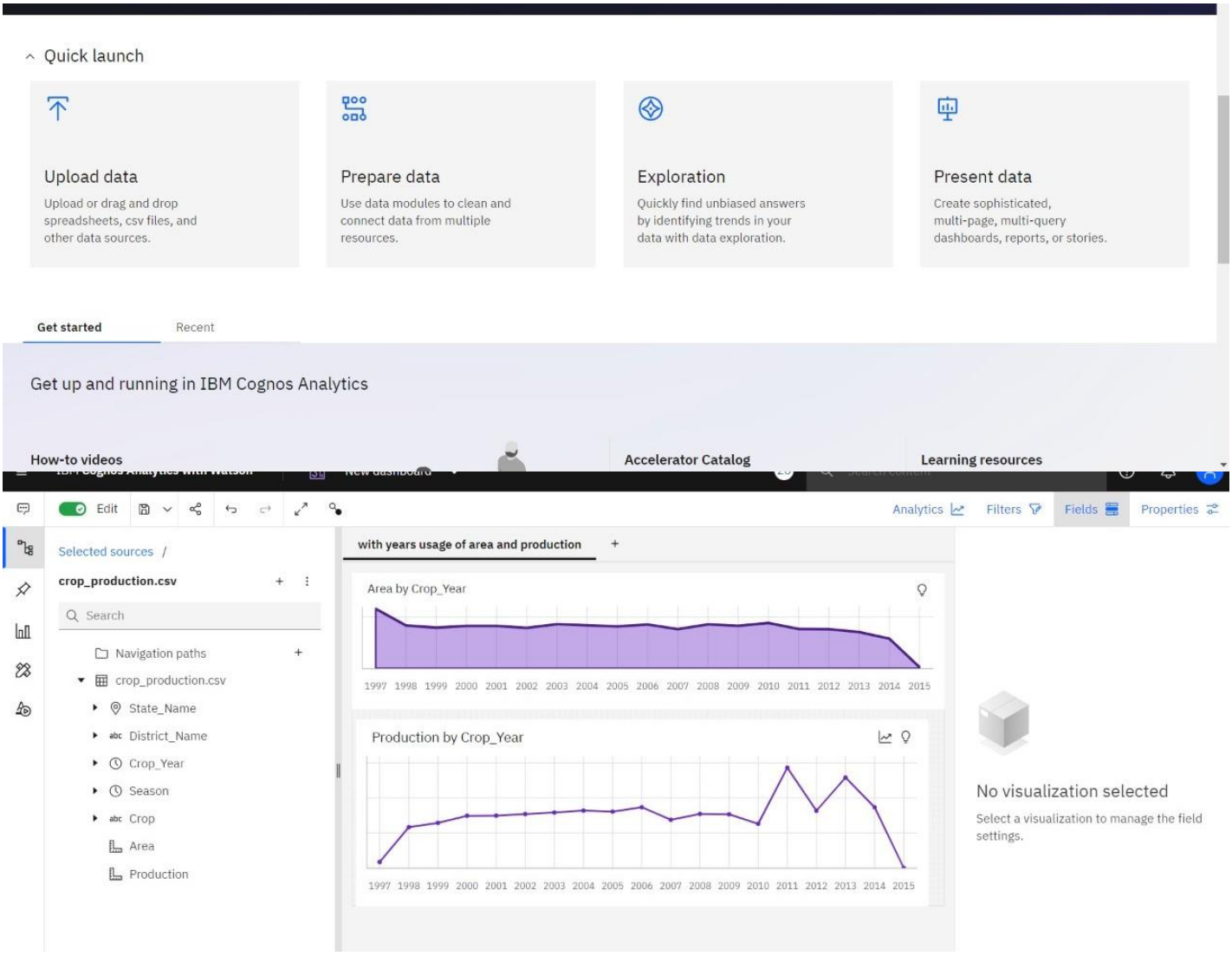
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

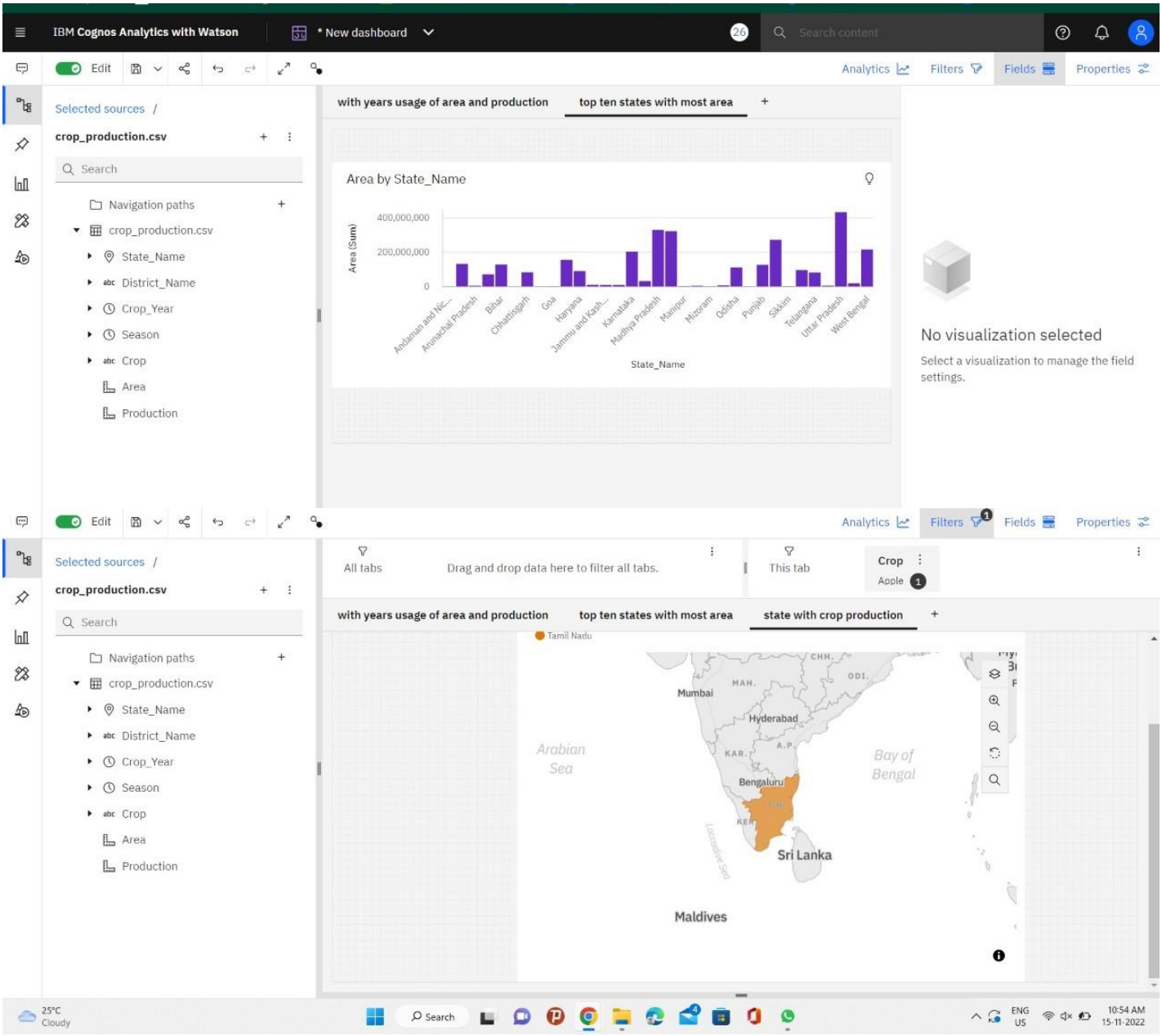
Velocity:

We have a 24-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

AV = Sprint Duration / Velocity = 20 / 10 = 2 Burndow

7. CODING SOLUTIONING





8. TESTING

8.1 USER ACCEPTANCE TESTING

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [Global sales data

analytics] project at the time of the release to User Acceptance Testing (UAT).

2. Test Case Analysis

This report shows the number of test cases that have passed ,failed,and untested.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	3	1	1	1	0
Duplicate	1	0	0	0	1
External	0	2	0	0	2
Fixed	1	2	0	2	5
Not Reproduced	0	0	1	0	1
Skipped	0	0	0	0	0
Won't Fix	0	1	0	0	1
Totals	5	6	2	3	16

8.2 PERFORMANCE TESTING

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 25
2.	Data Responsiveness	Very responsive
3.	Amount Data to Rendered (DB2 Metrics)	15 MB (crop_production.csv)
4.	Utilization of Data Filters	Utilized to full effectiveness
5.	Effective User Story	No of Scene Added - 5
6.	Descriptive Reports	No of Visualizations / Graphs - 5

9. ADVANTAGES& DISADVANTAGES

- **Advantages:**

✞ Data analytics helps in making better decisions

✞ Increase the efficiency of the work

✞ Technology saves money. Using current agricultural technology can help farmers save money. With the help of modern technologies, farmers may work more efficiently, with less effort, and in less time.

✞ farmers can now do more work with less effort and in less time.**Disadvantages:** 1. High costs of maintenance.

2. Farmers find it difficult to keep up with technology.

10. CONCLUSION

Data analysis includes the inspection, modification, modeling, and transforming of data as per the need of the research topic.

Agriculture yield data is used to analyse and improve the crop yield and represent in the form of a Graphs through data visualization technique.

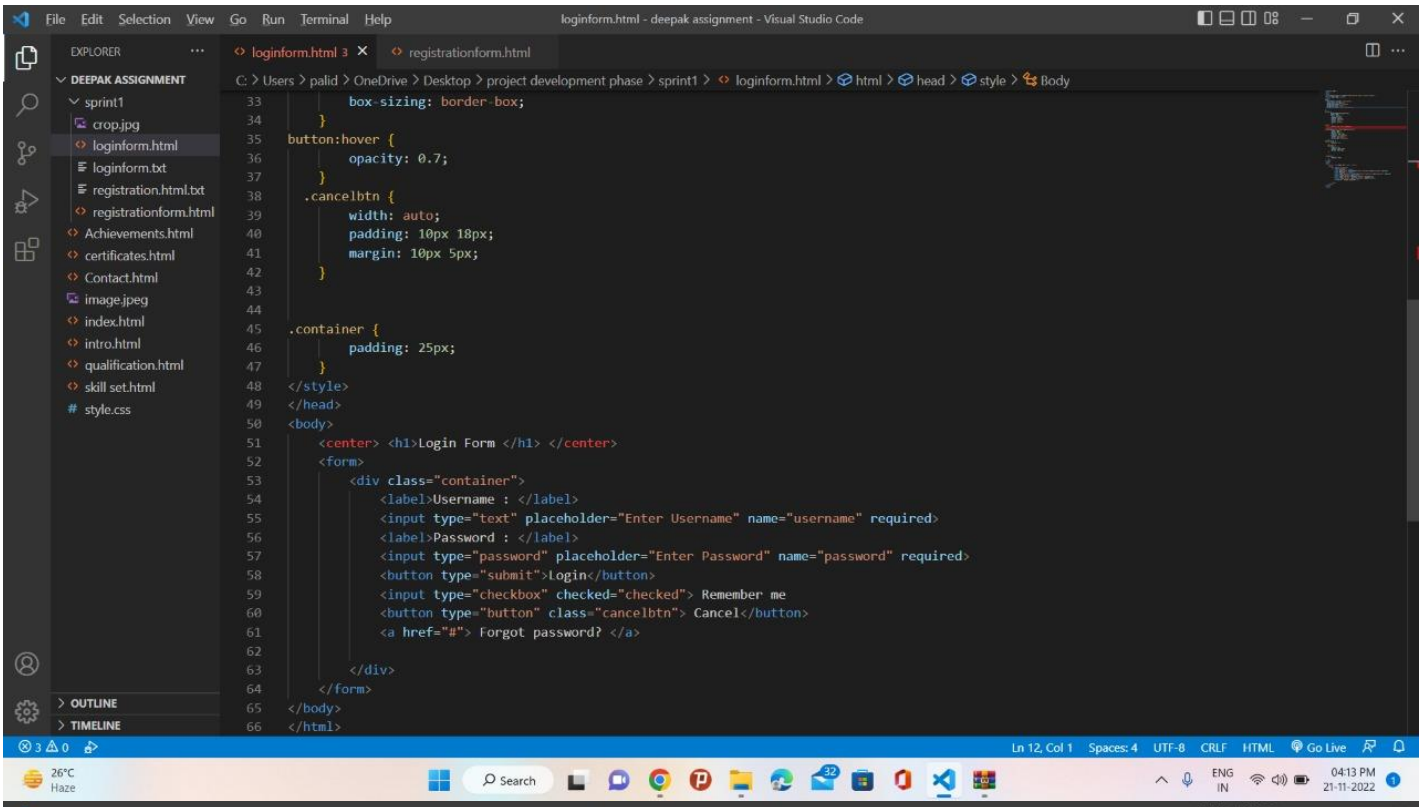
12.FUTURE SCOPE

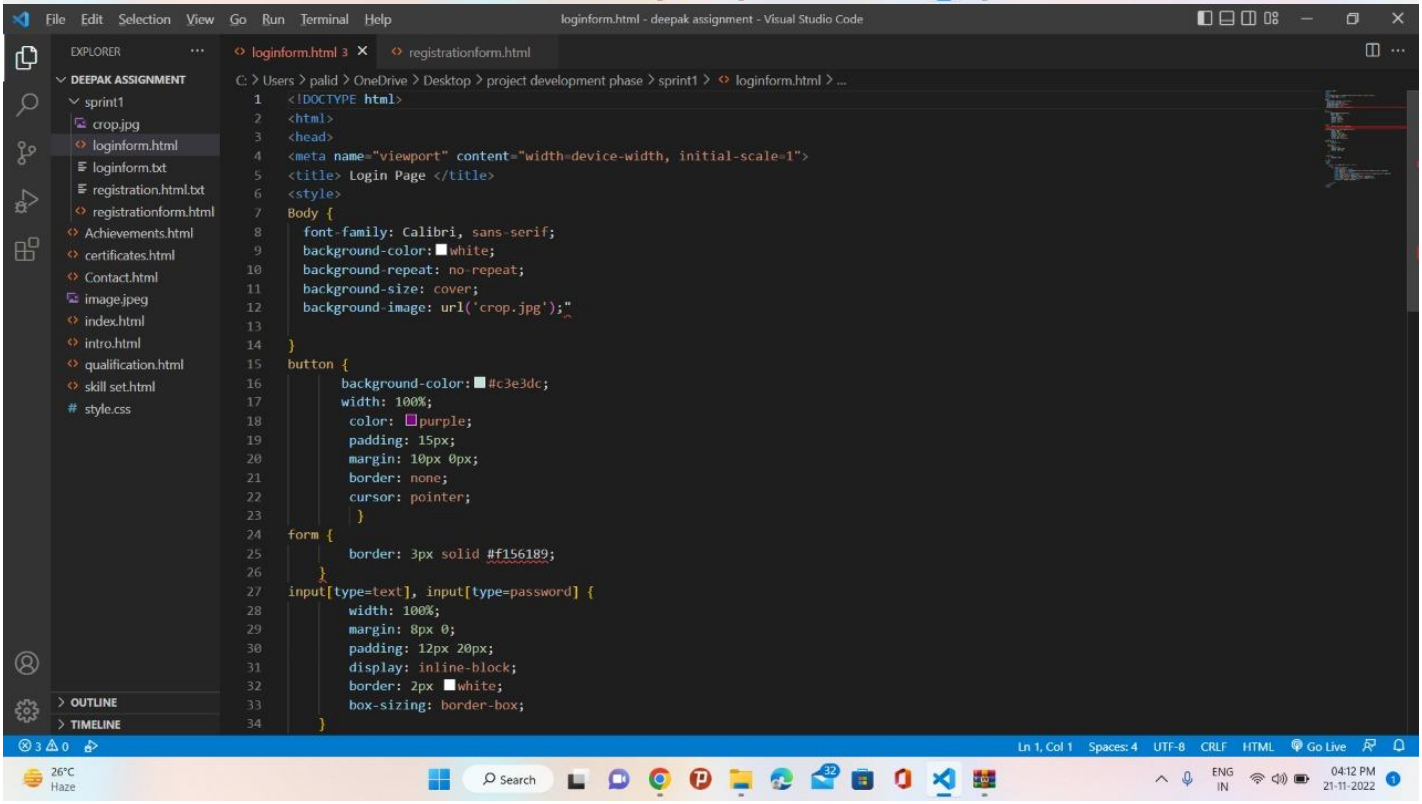
In the future, we expect to extend the same as an even more easily accessible mobile application and further enhancements on the user experience is aimed to be implemented.

13.APPENDEX

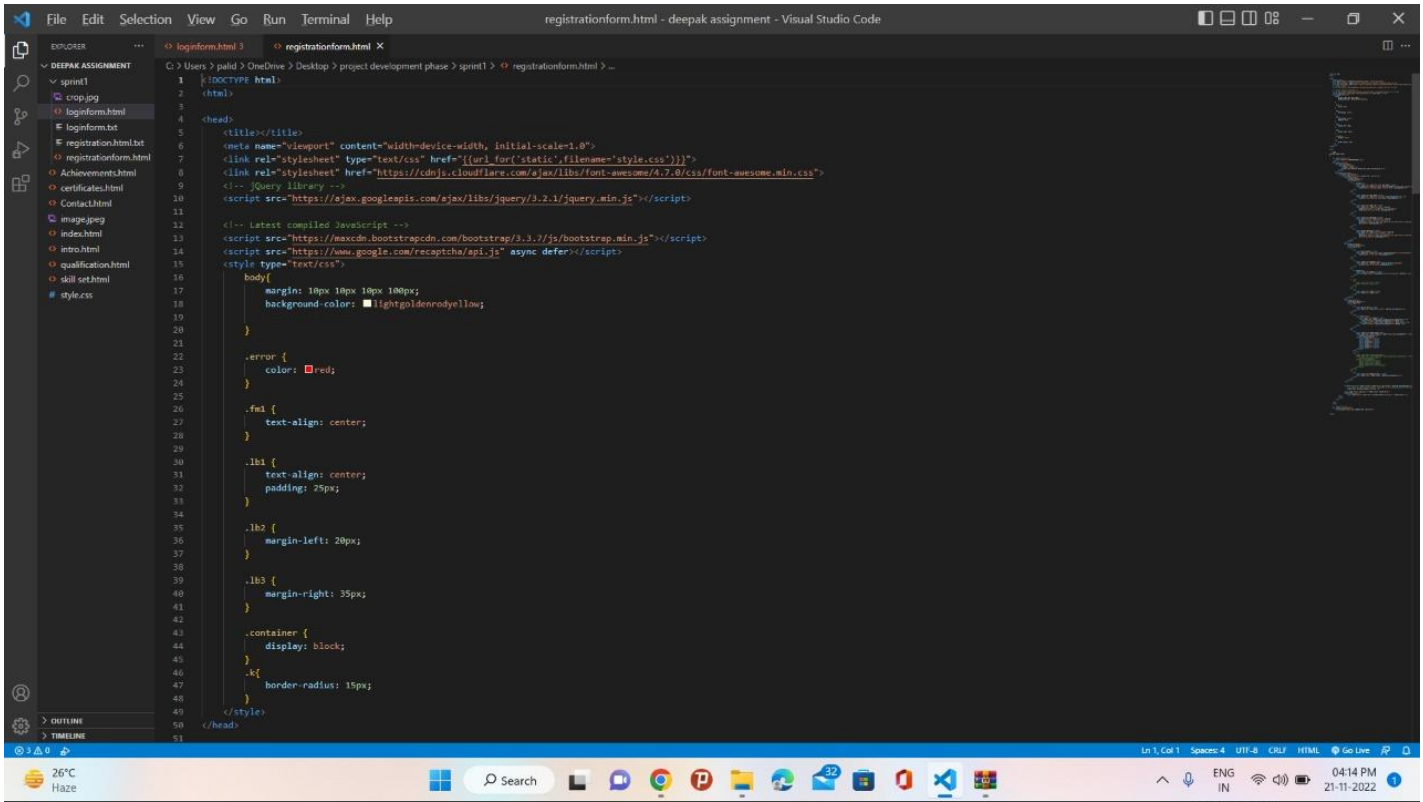
SOURCE CODE:

Login form.html





Registration form: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loginform.html 3
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registration.html.txt
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Achievements.html
certificates.html
Contact.html
image.jpeg
index.html
intro.html
qualification.html
skill set.html
style.css
OUTLINE
TIMELINE
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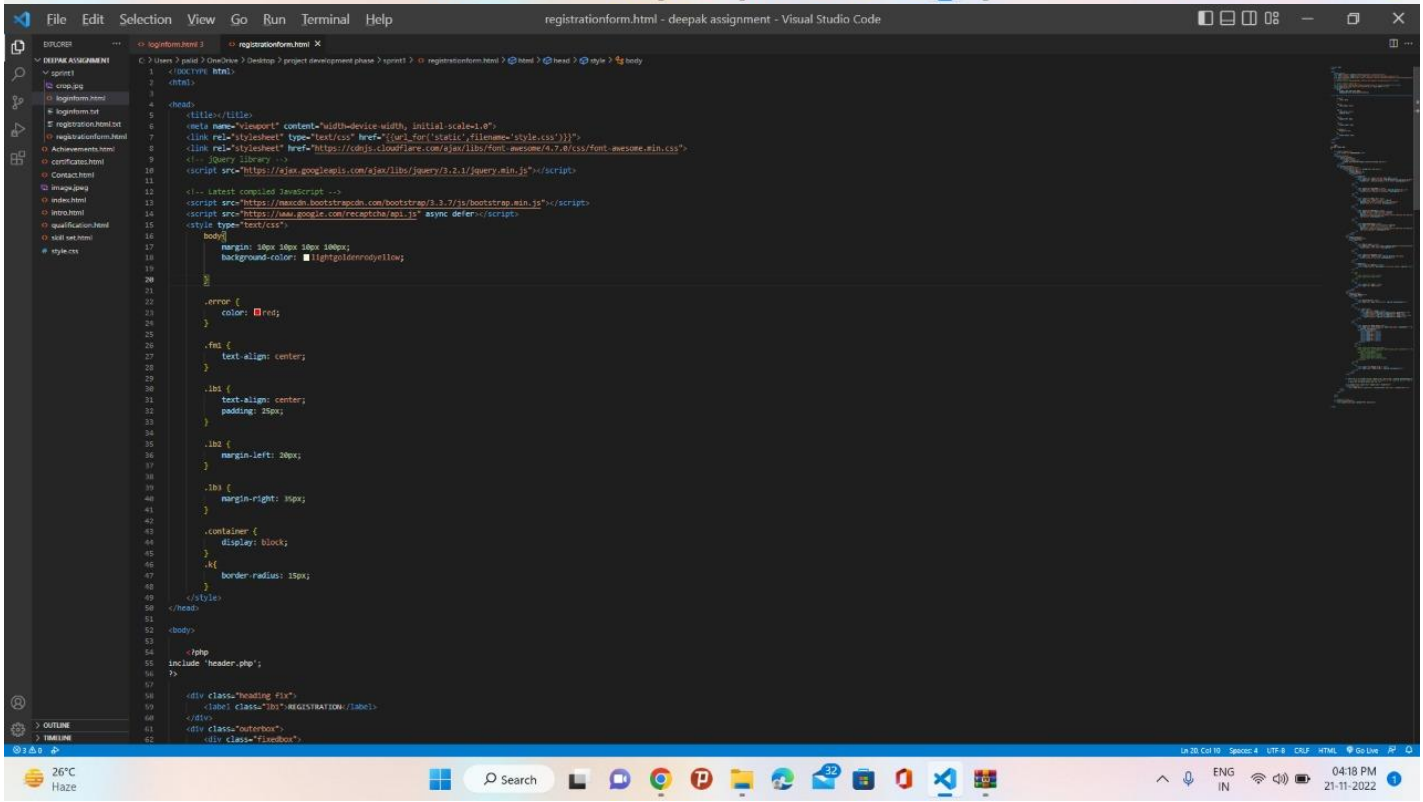
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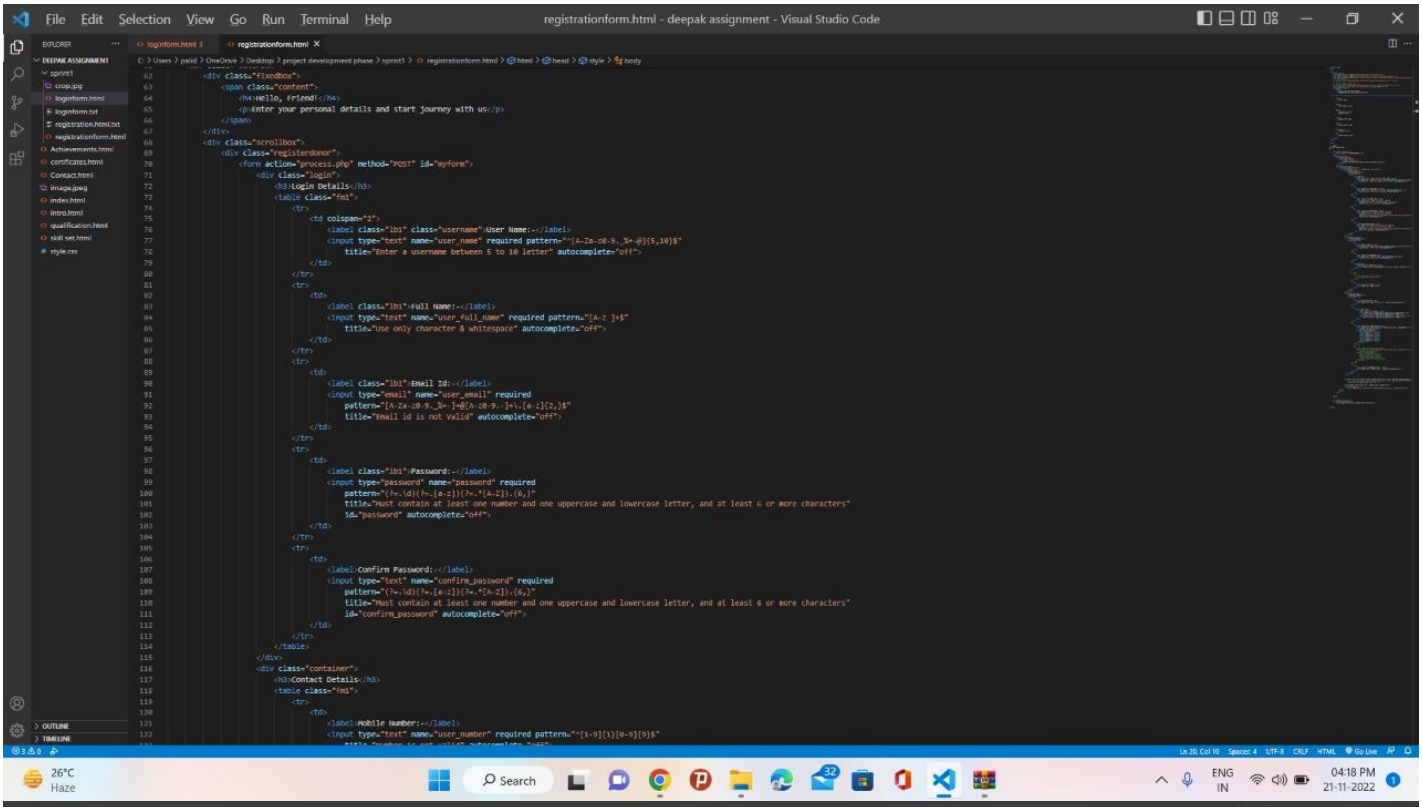
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sprint3
crop.jpg
loginform.html
loginform.txt
registration.html.txt
registrationform.html
Achievements.html
certificates.html
Contact.html
image.jpeg
index.html
intro.html
qualification.html
skill set.html
style.css
OUTLINE
TIMELINE

<h4>Hello, friend!</h4>
Enter your personal details and start journey with us

<form action="process.php" method="POST" id="myform">

<h3>Login Details</h3>
<table class="fmi">
<tr>
<td colspan="2">
<label class="lb1" class="username">User Name:-</label>
<input type="text" name="user_name" required pattern="^[A-Za-z0-9._%+-@]{5,10}$"
title="Enter a username between 5 to 10 letter" autocomplete="off">
</td>
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<td>
<label class="lb1">Full Name:-</label>
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<td>
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id="password" autocomplete="off">
</td>
</tr>
<tr>
<td>
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pattern="(?=.\d){1=.[a-z]){1=.*[A-Z]).{6,}"
title="Must contain at least one number and one uppercase and lowercase letter, and at least 6 or more characters"
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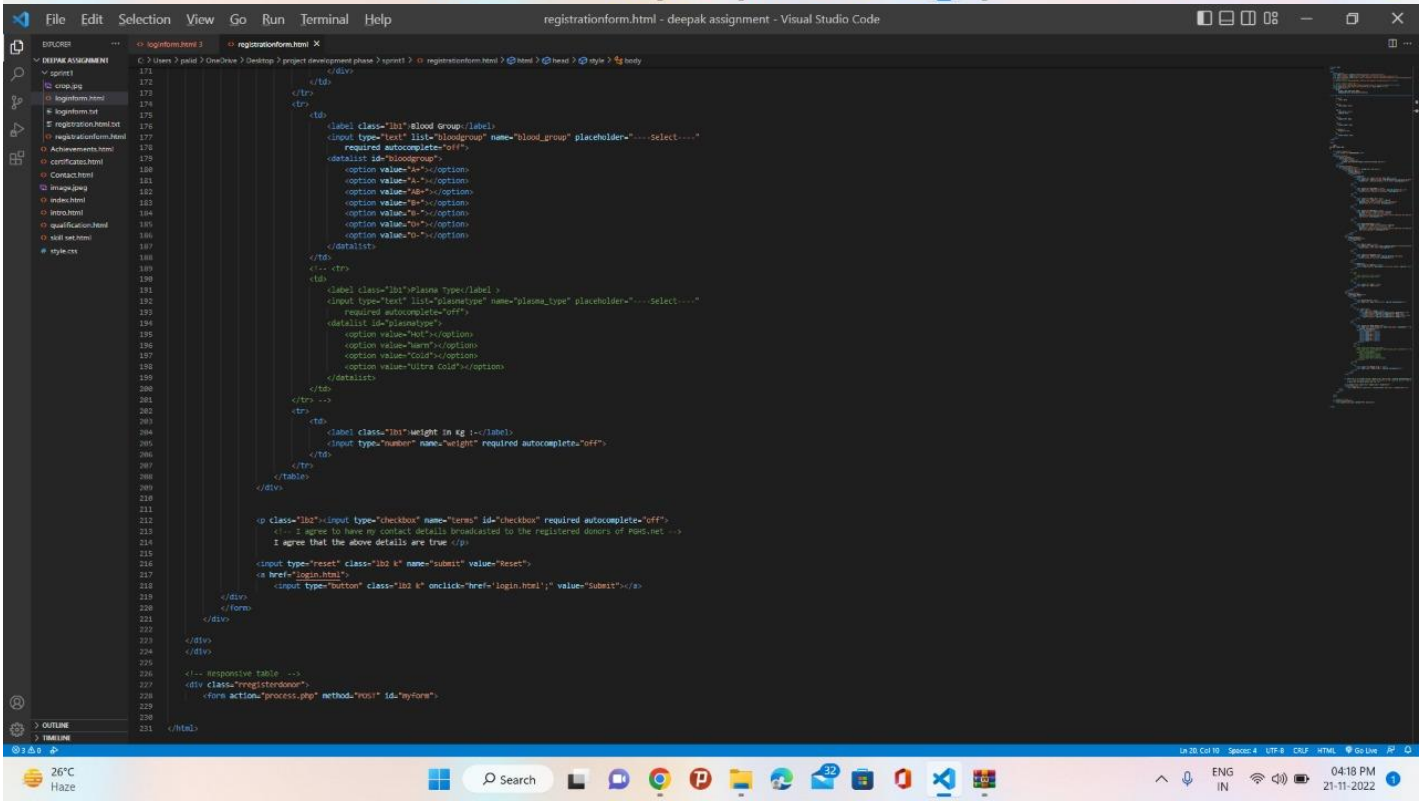
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<option value="A-"></option>
<option value="AB+"></option>
<option value="B+"></option>
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<!-- <tr>
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<option value="Hot"></option>
<option value="Warm"></option>
<option value="Cold"></option>
<option value="Ultra Cold"></option>
</datalist>
</td>
</tr> -->
<tr>
<td>
<label class="lb1">Weight in Kg :-</label>
<input type="number" name="weight" required autocomplete="off">
</td>
</tr>
</table>

<input type="checkbox" name="terms" id="checkbox" required autocomplete="off">
<!-- I agree to have my contact details broadcasted to the registered donors of PBHS.net -->
I agree that the above details are true
<input type="reset" class="lb2 k" name="submit" value="Reset">

<input type="button" class="lb2 k" onclick="href='login.html';" value="Submit">

</form>

<!-- Responsive table -->

<form action="process.php" method="POST" id="myform">
</html>
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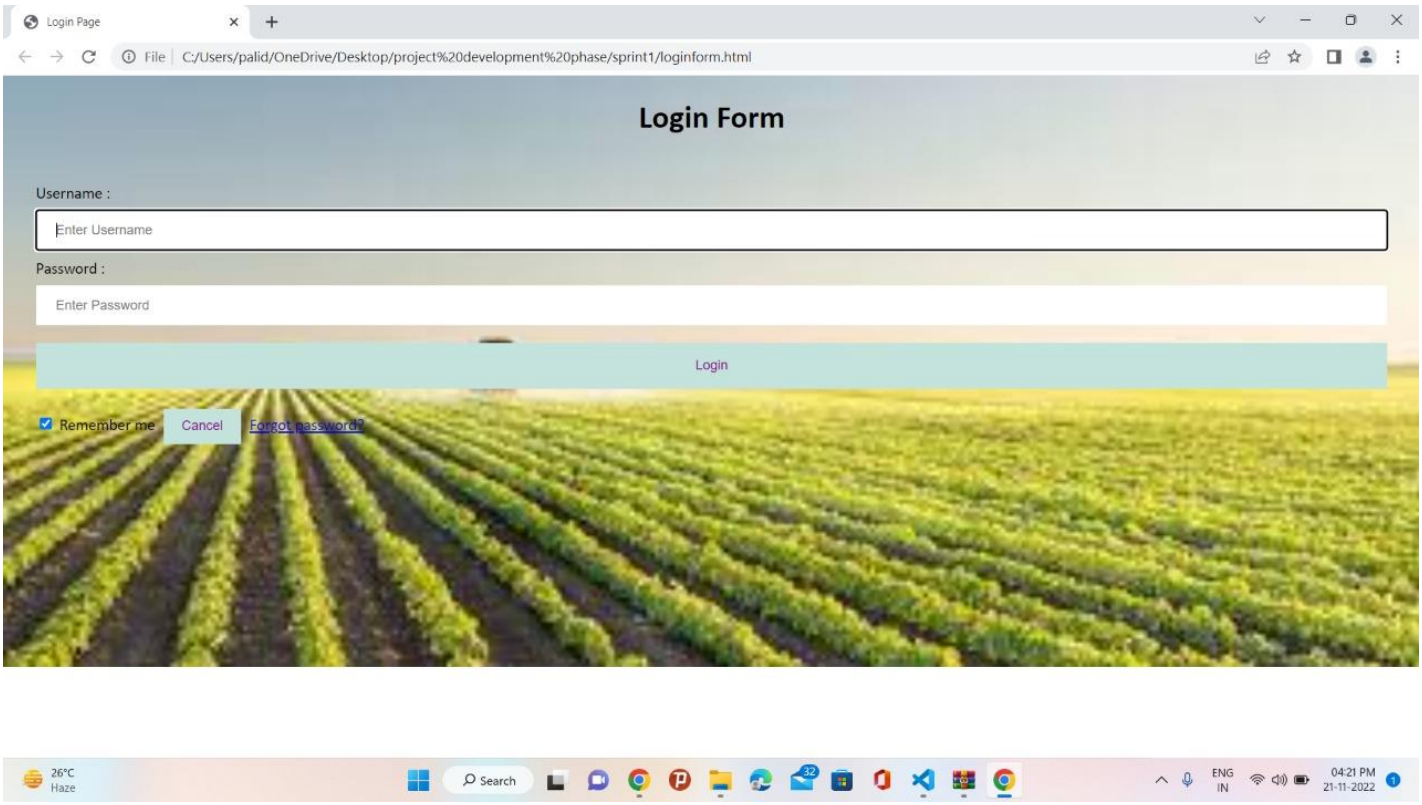
Output:


Login Page
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Login Form
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Enter Username
Password :
Enter Password
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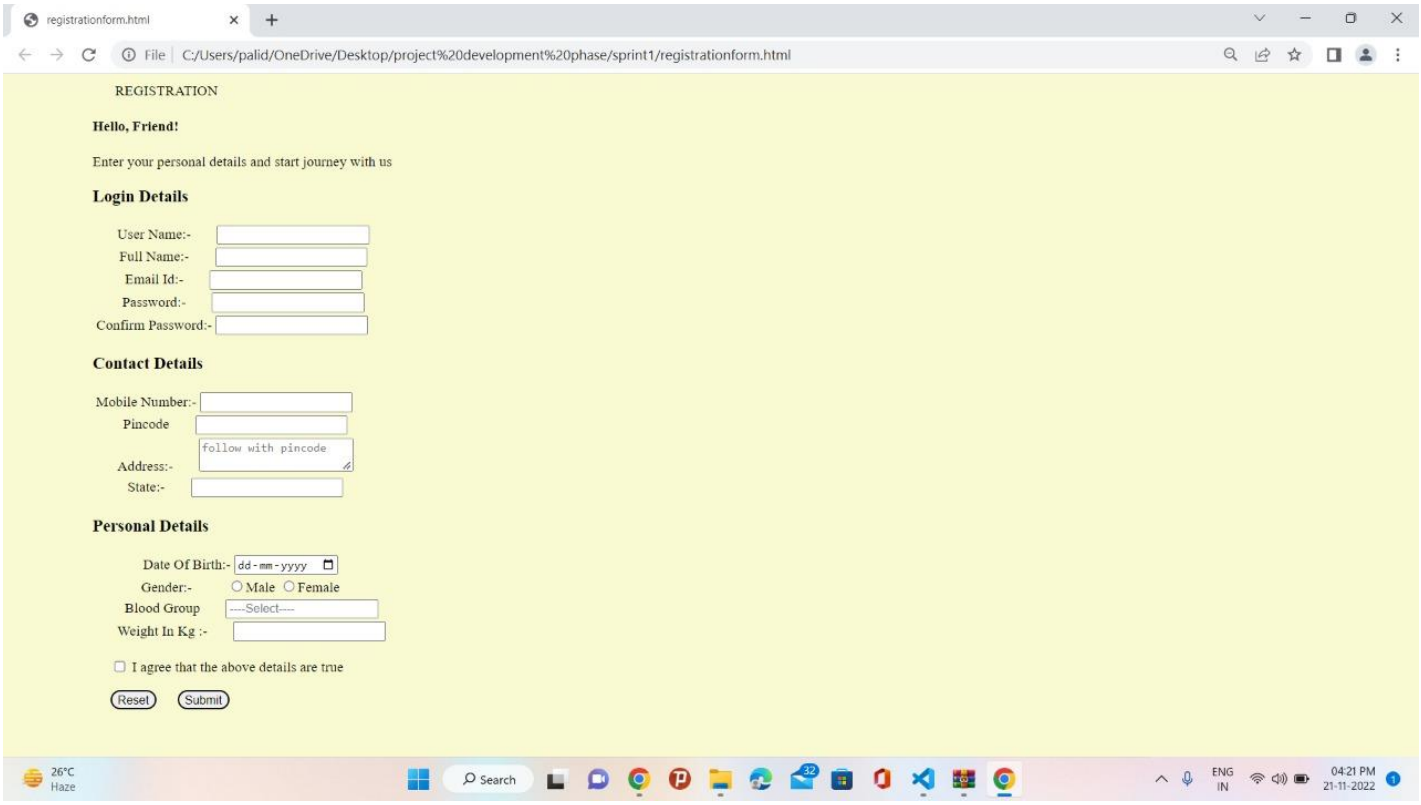

GITHUB : https://github.com/IBM-EPBL/IBM-Project-49749-1660837591

PROJECT DEMO LINK:
https://drive.google.com/file/d/1bdDFuYBx9xlehnQS_4z4F0VWmYjZUHcY/view

THANK YOU !!!!