PIP104 PROFESSIONAL PRACTICE-II
VIVA-VOCE

PROJECT TITLE

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Introduction

- Agriculture, being the backbone of global food production, faces unprecedented challenges in the 21st century, primarily driven by the increasing frequency and intensity of climatic events. Among the myriad consequences of climate change, the vulnerability of cash crops to various environmental stressors has become a significant concern for farmers, policymakers, and the broader agricultural industry. The imperative to address these challenges has given rise to the development of predictive modeling techniques for cash crop loss, providing a proactive means to mitigate risks and foster sustainable agricultural practices.
- Climate-related events such as extreme temperatures, droughts, floods, and pest infestations have the potential to inflict severe damage on cash crops, leading to substantial economic losses and compromising global food security. In this context, the ability to anticipate and mitigate the impact of such events becomes crucial. Predictive modeling emerges as a promising avenue, leveraging advancements in machine learning, remote sensing technologies, and comprehensive datasets to forecast cash crop losses with greater accuracy.

Literature Review

1. **Overview of Agricultural Risk Assessment:** Agricultural risk assessment has been a focal point in recent literature due to the escalating challenges posed by climate change. Researchers have highlighted the need for accurate and timely prediction models to mitigate the impact of environmental stressors on cash crops. Early studies laid the foundation for understanding the vulnerability of crops to diverse factors, emphasizing the importance of integrated approaches for comprehensive risk assessment.
2. **Machine Learning Applications in Agriculture:** With the advent of machine learning techniques, a paradigm shift occurred in the field of cash crop loss prediction. Researchers increasingly turned to algorithms such as random forests, support vector machines, and neural networks to analyze vast datasets encompassing climate variables, soil characteristics, and crop health indicators. These applications demonstrated promising results in improving the precision and efficiency of cash crop loss predictions.
3. **Remote Sensing Technologies:** The integration of remote sensing technologies has emerged as a cornerstone in cash crop loss prediction. Utilizing satellite imagery and unmanned aerial vehicles (UAVs), researchers have enhanced the spatial and temporal resolution of data.

Research Gaps Identified

- Several research gaps exist in the field of cash crops, including:
- 1. Sustainable Farming Practices:* There's a need for research on sustainable agricultural practices to enhance crop yields while minimizing environmental impact.
- 2. Crop Disease Management:* Addressing emerging diseases affecting cash crops and developing effective management strategies to safeguard yields.
- 3. Climate Change Resilience:* Studying the impact of climate change on cash crops and developing resilient varieties that can withstand changing environmental conditions.

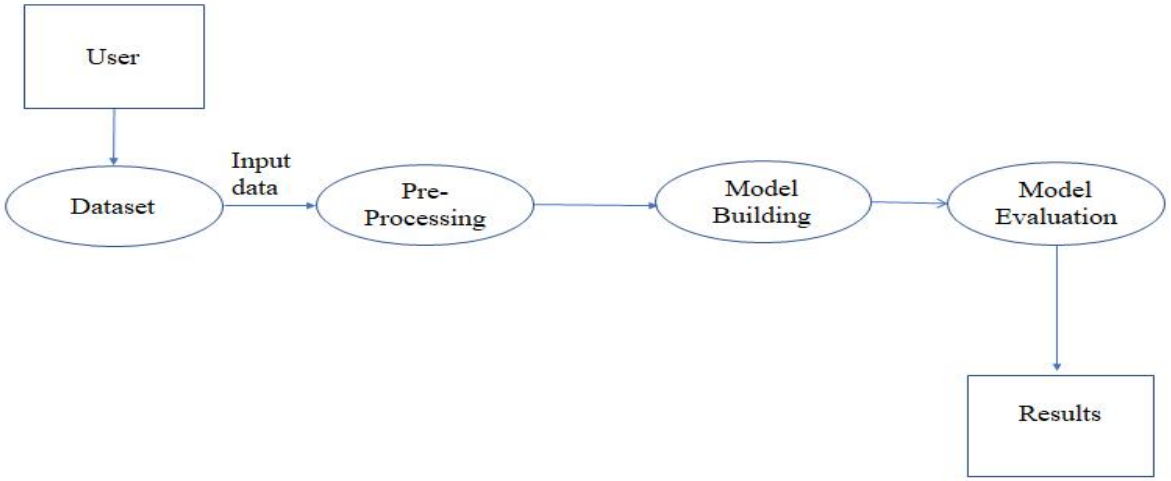
Proposed Methodology

- We proposed a system with the help of machine learning techniques and algorithms like Linear Regression and Random Forests Regressor to predict the crop can be grown based on different parameters entered by the user in the front end like state and district name, temperature, humidity, moisture content and pH value. Here Random Forest Regresser gave 100% accuracy and it is used as final model for crop prediction. We also suggest which fertilizers should be used based on pH value entered by the user in the front end

Objectives

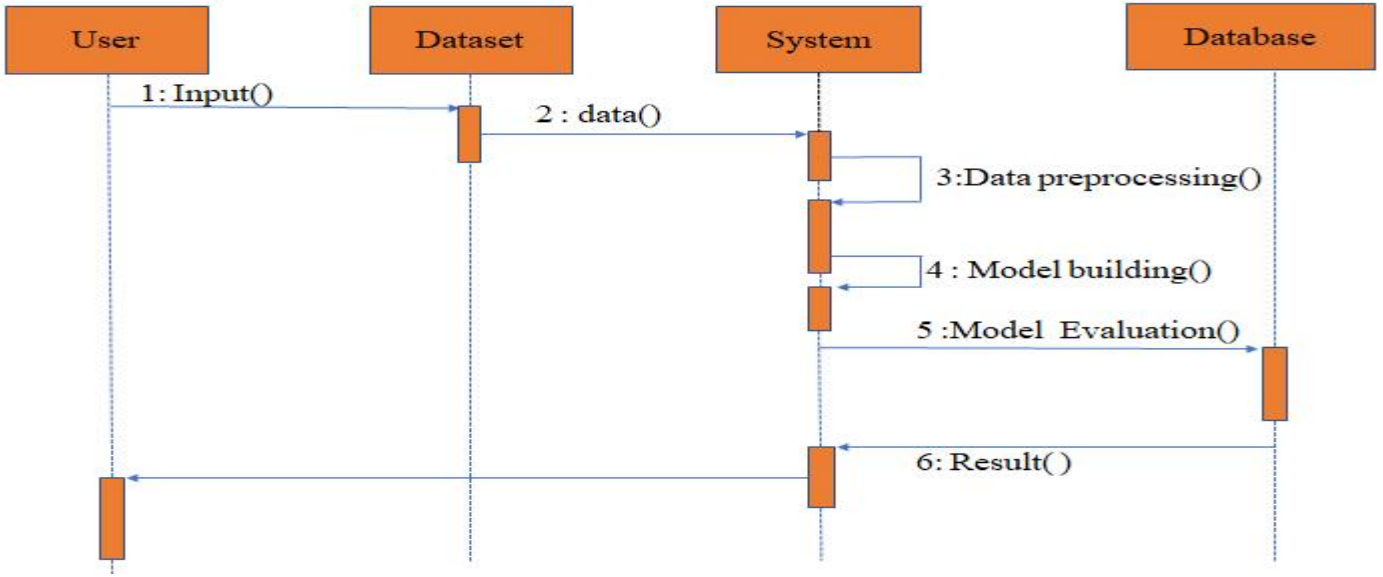
- The main aim of this project to predict the crop can be grown based on different data like temperature, humidity, pH and moisture content with good accuracy with help of machine learning techniques and algorithms.

System Design & Implementation



- The user will provide the dataset to the system.
- The dataset is preprocessed in order to increase the accuracy of the model.
- The model is built using different algorithms.
- The model is evaluated and model with best accuracy is finalized.
- The finalized model will predict the results.

System Design & Implementation



- The user will give dataset as input to the system.
- The system will store the dataset given by the user in its database.
- The system will do preprocessing of the data stored.
- The model is built using various ML algorithms and trained using preprocessed data.
- The model is evaluated and the algorithm with best accuracy is finalized.
- The finalized model will predict the results.

System Design & Implementation

- **Python**

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting language. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance.

- **Features :**

Easy to code

Free and Open Source

Object-Oriented Language

High-Level Language

System Design & Implementation

- **Python IDLE :**
  - An IDE (or Integrated Development Environment) is a program dedicated to software development.
  - IDEs integrate several tools specifically designed for software development. These tools usually include:
    - An editor designed to handle code (with, for example, syntax highlighting and auto-completion)
    - Build, execution, and debugging tools
    - Some form of source control

System Design & Implementation

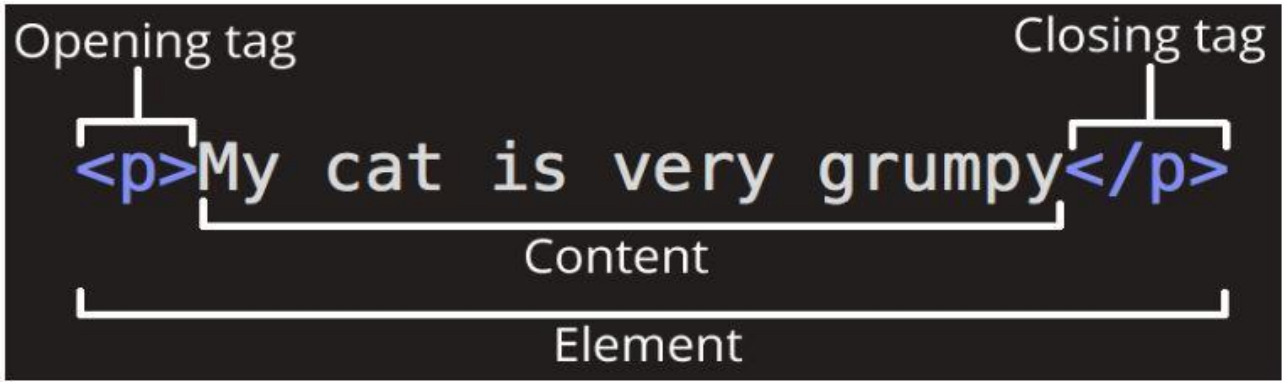
- **HTML**

HTML (Hypertext Markup Language) is the code that is used to structure a web page and itscontent. For example, content could be structured within a set of paragraphs, a list of bulleted points, or using images and data tables.

HTML is a markup language that defines the structure of your content. HTML consists of a series of elements, which you use to enclose, or wrap, different parts of the content to make it appear a certain way, or act a certain way. The enclosing tags can make a word or image hyperlink to somewhere else, can italicize words, can make the font bigger or smaller, and so on.

System Design & Implementation

Anatomy of HTML Element :



The main parts of our element are as follows:

1. The opening tag: This consists of the name of the element (in this case, p), wrapped in opening and closing angle brackets. This states where the element begins or starts to take effect — in this case where the paragraph begins.
2. The closing tag: This is the same as the opening tag, except that it includes a forward slash before the element name. This states where the element ends — in this case where the paragraph ends. Failing to add a closing tag is one of the standard beginner errors and can lead to strange results.
3. The content: This is the content of the element, which in this case, is just text.

System Design & Implementation

Elements can also have attributes that look like the following:

Attributes contain extra information about the element that you don't want to appear in the actual content. Here, class is the attribute name and editor-note is the attribute value. The class attribute allows you to give the element a non-unique identifier that can be used to target it (and any other elements with the same class value) with style information and other things.

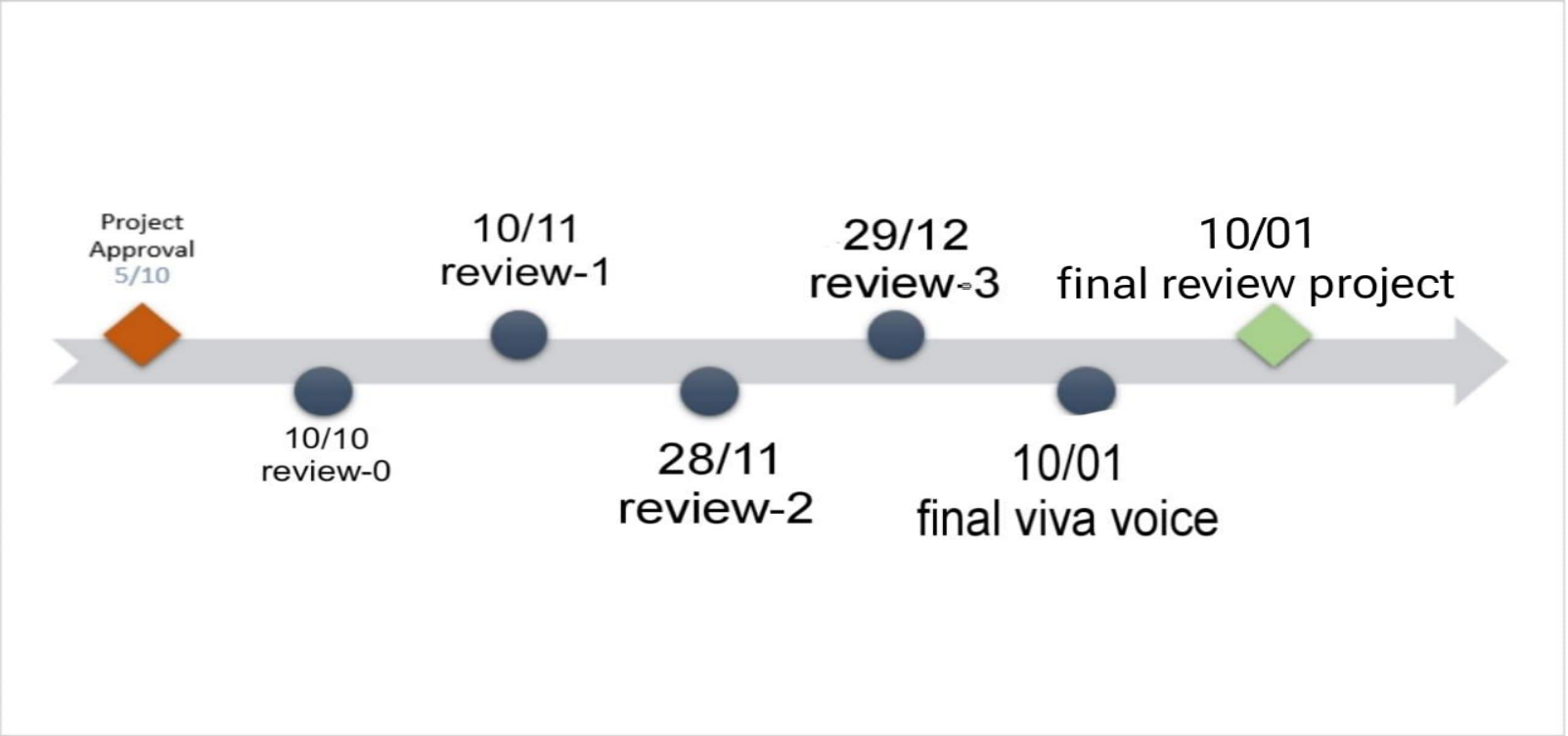
An attribute should always have the following:

1.A space between it and the element name (or the previous attribute, if the element already has one or more attributes).

2.The attribute name followed by an equal sign.

The attribute value wrapped by opening and closing quotation marks.

Timeline of Project



Outcomes / Results Obtained

- The system with the help of machine learning techniques and algorithms like Linear Regression XGB Regressor and Random Forests Regressor predicts the yield and crop can be grown based on different parameters entered by the user in the front end with good accuracy.
- Here we got accuracy of 89.24% for Crop Yield Prediction and 54.62% for Crop Prediction given by Random Forest Regressor so we used random forest regressor as our final model for both yield and crop prediction based on location.

Conclusion

- In conclusion, developing accurate cash crop loss prediction models is crucial for mitigating agricultural risks. By leveraging advanced technologies and data analytics, we can enhance resilience in farming practices, enabling farmers to proactively address potential challenges and secure sustainable yields. This proactive approach not only safeguards livelihoods but also contributes to overall food security and economic stability.

References

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Thank You