CROP RECOMMENDATION SYSTEM

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AGENDA:

- 1.Problem Statement
- 2.Project Overview
- 3.Describtion about dataset
- 4.End Users
- 5.Our Solution and Proposition
- 6.Key Features
- 7.Modelling Approach
- 8.Results and Evaluation

PROBLEM STATEMENT:

- ✓ The Crop Recommendation System is an advanced application designed to assist farmers and agricultural professionals in making informed decisions about crop selection for their fields.

- ✓ By leveraging the power of the LightGBM model and providing a user-friendly interface through Flask, this system provides accurate and efficient crop recommendations based on various crucial factors such as soil type, climate conditions, and crop attributes.

- ✓ Precision agriculture is in trend nowadays. It helps the farmers to get informed decision about the farming strategy.

Describtion about dataset:

- N - ratio of Nitrogen content in soil
- P - ratio of Phosphorous content in soil
- K - ratio of Potassium content in soil
- temperature - temperature in degree Celsius
- humidity - relative humidity in %
- ph - ph value of the soil
- rainfall - rainfall in mm

End user:

- Farmers
- Agricultural consultants
- Agricultural researchers
- Agronomists(special in the science of soil management and crop production)
- Policymakers
- Extension Agents

Our solution and proposition:

- Our solution for a crop recommendation system is to develop a user-friendly platform that integrates various data sources such as soil quality, climate conditions, historical crop performance, and market demand. Through advanced algorithms and machine learning techniques, our system will analyze this data to provide personalized crop recommendations tailored to specific geographic locations and individual farming conditions.

Value proposition:

- Increased yield,cost savings,risk mitigation,improved profitability,sustainability

-Overall crop recommendation system offers a comprehensive solution that empowers farmers with actionable insights.

Features:

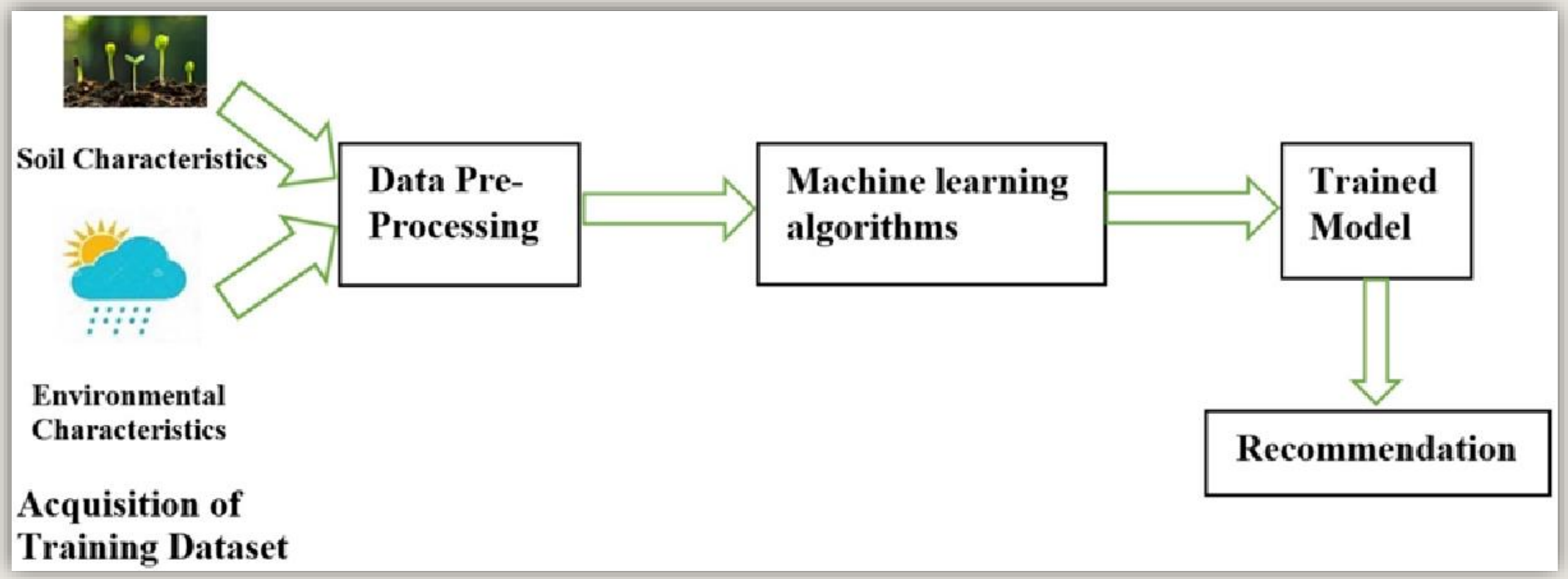
LightGBM Model: The crop recommendation system employs the LightGBM algorithm, a high-performance gradient boosting framework known for its accuracy and efficiency in handling large-scale datasets.

Data-driven Recommendations: By analyzing historical crop data and relevant environmental factors, the system generates personalized recommendations for farmers based on their specific requirements and field characteristics

Interactive User Interface: The Flask-based user interface offers a seamless and intuitive experience. Users can easily input essential parameters such as soil type, climate conditions, and crop attributes, and receive tailored recommendations accordingly.

Enhanced Decision Making: The system aims to enhance decision-making capabilities for farmers, allowing them to optimize crop selection, maximize yield potential, and mitigate risks associated with unsuitable crop choices.

Model:

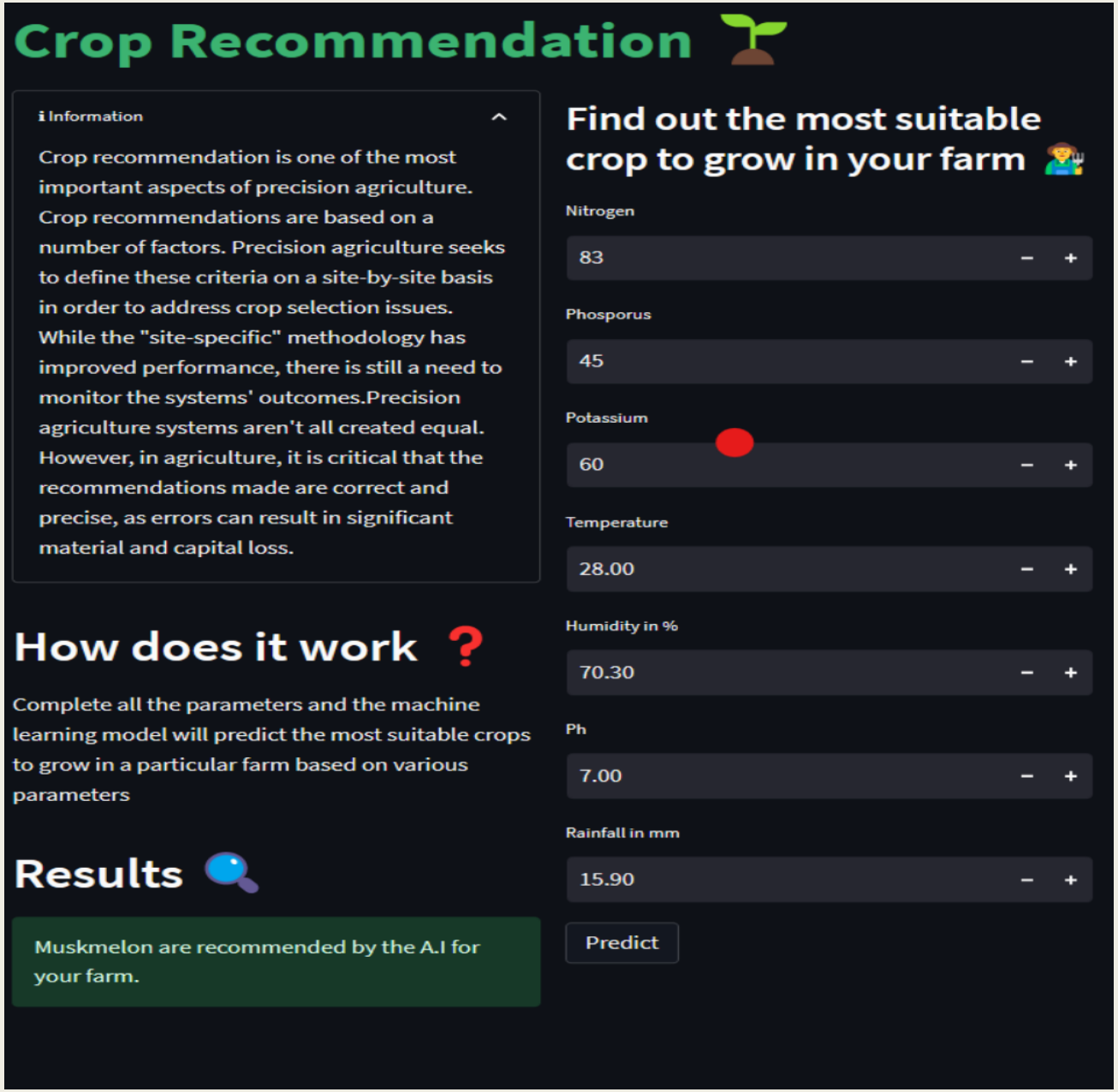

Soil Characteristics
Environmental Characteristics
Acquisition of Training Dataset
Data Pre-Processing
Machine learning algorithms
Trained Model
Recommendation

```
import streamlit as st
import pandas as pd
import numpy as np
import os
import pickle
import warnings
st.set_page_config(page_title="Crop Recommender", page_icon=" 🌿 ", layout='centered', initial_sidebar_state="collapsed")
def load_model(modelfile):
loaded_model = pickle.load(open(modelfile, 'rb'))
return loaded_model
def main():
    # title
    html_temp = """
    <div>
    <h1 style="color:MEDIUMSEAGREEN;text-align:left;"> Crop Recommendation  🌱 </h1>
    </div>
    """
    st.markdown(html_temp, unsafe_allow_html=True)
col1,col2  = st.columns([2,2])
K = st.number_input("Potassium", 1,10000)
with col1:
        with st.expander(" ℹ️ Information", expanded=True):
```

```
st.write("""

        Crop recommendation is one of the most important aspects of precision agriculture. Crop recommendations are based on a number of factors. Precision agriculture seeks to define these criteria on a site-by-site basis in order to address crop selection issues. While the "site-specific" methodology has improved performance, there is still a need to monitor the systems' outcomes.Precision agriculture systems aren't all created equal.

        However, in agriculture, it is critical that the recommendations made are correct and precise, as errors can result in significant material and capital loss.

 """)

        '''

        ## How does it work ❓

        Complete all the parameters and the machine learning model will predict the most suitable crops to grow in a particular farm based on various parameters

        ''’

with col2:

        st.subheader(" Find out the most suitable crop to grow in your farm 👨‍🌾 ")

        N = st.number_input("Nitrogen", 1,10000)

        P = st.number_input("Phosporus", 1,10000)

K = st.number_input("Potassium", 1,10000)

        temp = st.number_input("Temperature",0.0,100000.0)

        humidity = st.number_input("Humidity in %", 0.0,100000.0)

 ph = st.number_input("Ph", 0.0,100000.0)

        rainfall = st.number_input

feature_list = [N, P, K, temp, humidity, ph, rainfall]
```

```
single_pred = np.array(feature_list).reshape(1,-1)
        if st.button('Predict'):
        loaded_model = load_model('LGBMModel.pkl')
          prediction = loaded_model.predict(single_pred)
          col1.write('''
                                    ## Results 🔮
                                    ''')("Rainfall in mm",0.0,100000.0)
col1.success(f"{prediction.item().title()} are recommended by the A.I for your farm.")
     #code for html ☘️ 🌾 🌳 👩‍🌾 🍃


   hide_menu_style = """
   <style>
   #MainMenu {visibility: hidden;}
   </style>
   """
hide_menu_style = """
        <style>
        #MainMenu {visibility: hidden;}
        </style>
        """
st.markdown(hide_menu_style, unsafe_allow_html=True)
if __name__ == '__main__':
                    main()
```

Output:


Crop Recommendation
Information
Crop recommendation is one of the most important aspects of precision agriculture. Crop recommendations are based on a number of factors. Precision agriculture seeks to define these criteria on a site-by-site basis in order to address crop selection issues. While the "site-specific" methodology has improved performance, there is still a need to monitor the systems' outcomes.Precision agriculture systems aren't all created equal. However, in agriculture, it is critical that the recommendations made are correct and precise, as errors can result in significant material and capital loss.
How does it work
Complete all the parameters and the machine learning model will predict the most suitable crops to grow in a particular farm based on various parameters
Results
Muskmelon are recommended by the A.I for your farm.
Find out the most suitable crop to grow in your farm
Nitrogen
83
Phosporus
45
Potassium
60
Temperature
28.00
Humidity in %
70.30
Ph
7.00
Rainfall in mm
15.90
Predict