Crop Recommendation System

A new way to Grow

We are the students of Lakshmi Narain College of Technology, Excellence, Bhopal. Our Team is FARM IN ARM and we are looking forward to bringing a smart change in the farming techniques. Thus, an attempt to help our farmers using advanced technologies. So, let us have a look at what we have for our farmers?

Parameters we will be using in our model as the independent variables:

- **Season-** (The perfect amount of rain, sunlight, and heat produces the best crops!)
- **Region-** (geographical location plays a great role)
- **Minimum temperature** (directly influences the productivity of agricultural plants.)
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- **Maximum temperature**
- **Minimum Rainfall** (A good balance of **rain** and proper irrigation can lead to faster-growing plants)
- **Maximum Rainfall**
- **PH value**
- **Soil type** (**Soil** is a critical part of successful **agriculture**)
- **Average crop production (** gives us to get more accurate results)

In short, the target variable or we can say the dependent variable is:

- Crop

Season	Region	Min temp	Max temp	Min rainfall	Max rainfall	PH value	Soil type	crop

So our model will be built in the following steps:

- Data Collection
- Data Transformation
- Model Building
- Deployment

So let's dive deeper into these steps:

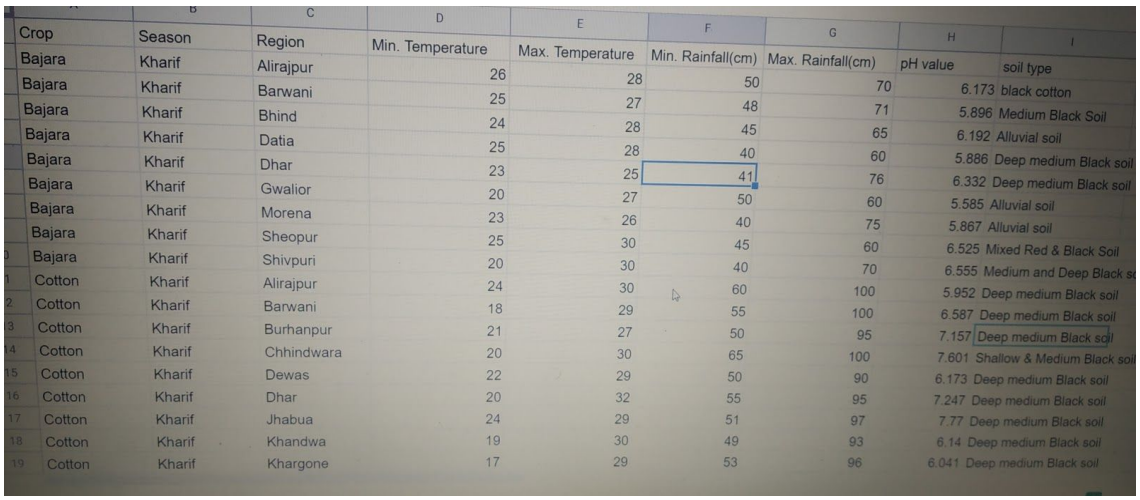
Data Collection:

Data collection is the most crucial step as we did not have any direct source of data. We first decided some parameters that we think are the most effective in deciding the type of crop that will be most suitable to grow in particular environmental and other conditions. After this, we extracted data from various websites on the internet. We had also thought of other parameters such as *Nitrogen level of Soil, Irrigation Facilities, Crop Rotation Cycle* but due to data paucity was not able to take them into account.

We have collected data on the following types of crops:

1. Cotton
2. Gram
3. Bajara
4. Banana
5. Potato
6. Arhar/Tur
7. Coriander

8. Maize



Crop	Season	Region	Min. Temperature	Max. Temperature	Min. Rainfall(cm)	Max. Rainfall(cm)	pH value	soil type
Bajara	Kharif	Alirajpur	26	28	50	70	6.173	black cotton
Bajara	Kharif	Barwani	25	27	48	71	5.896	Medium Black Soil
Bajara	Kharif	Bhind	24	28	45	65	6.192	Alluvial soil
Bajara	Kharif	Datia	25	28	40	60	5.886	Deep medium Black soil
Bajara	Kharif	Dhar	23	25	41	76	6.332	Deep medium Black soil
Bajara	Kharif	Gwalior	20	27	50	60	5.585	Alluvial soil
Bajara	Kharif	Morena	23	26	40	75	5.867	Alluvial soil
Bajara	Kharif	Sheopur	25	30	45	60	6.525	Mixed Red & Black Soil
Bajara	Kharif	Shivpuri	20	30	40	70	6.555	Medium and Deep Black s
Cotton	Kharif	Alirajpur	24	30	60	100	5.952	Deep medium Black soil
Cotton	Kharif	Barwani	18	29	55	100	6.587	Deep medium Black soil
Cotton	Kharif	Burhanpur	21	27	50	95	7.157	Deep medium Black soil
Cotton	Kharif	Chhindwara	20	30	65	100	7.601	Shallow & Medium Black soi
Cotton	Kharif	Dewas	22	29	50	90	6.173	Deep medium Black soil
Cotton	Kharif	Dhar	20	32	55	95	7.247	Deep medium Black soil
Cotton	Kharif	Jhabua	24	29	51	97	7.77	Deep medium Black soil
Cotton	Kharif	Khandwa	19	30	49	93	6.14	Deep medium Black soil
Cotton	Kharif	Khargone	17	29	53	96	6.041	Deep medium Black soil

Fig shows the data we are working on.

Data Transformation:

The collected data most of the time is never in such a form that can be directly fed into the machine learning model. So we have done some data transformation steps also which includes:

1. **Removal of Missing values:**
   Removal of null values as they produce inconsistencies at the time of prediction.
2. **Spelling abbreviations:**
   Spellings are not consistent in the data and need to be normalized to a single value to increase the accuracy of the model.
3. **Redundant Data**
   Redundant data will be removed because it does not give any sense to the training.
4. **Encoding:**
   Since ML models only work on the numeric values, not on the strings, we will use label encoding techniques to convert strings into numbers.

Model Building:

We will be using an ensemble learning approach in building the model. It means we will be using the power of more than one algorithm to predict the crop recommendation results. This will improve the accuracy of the model to a great extent.

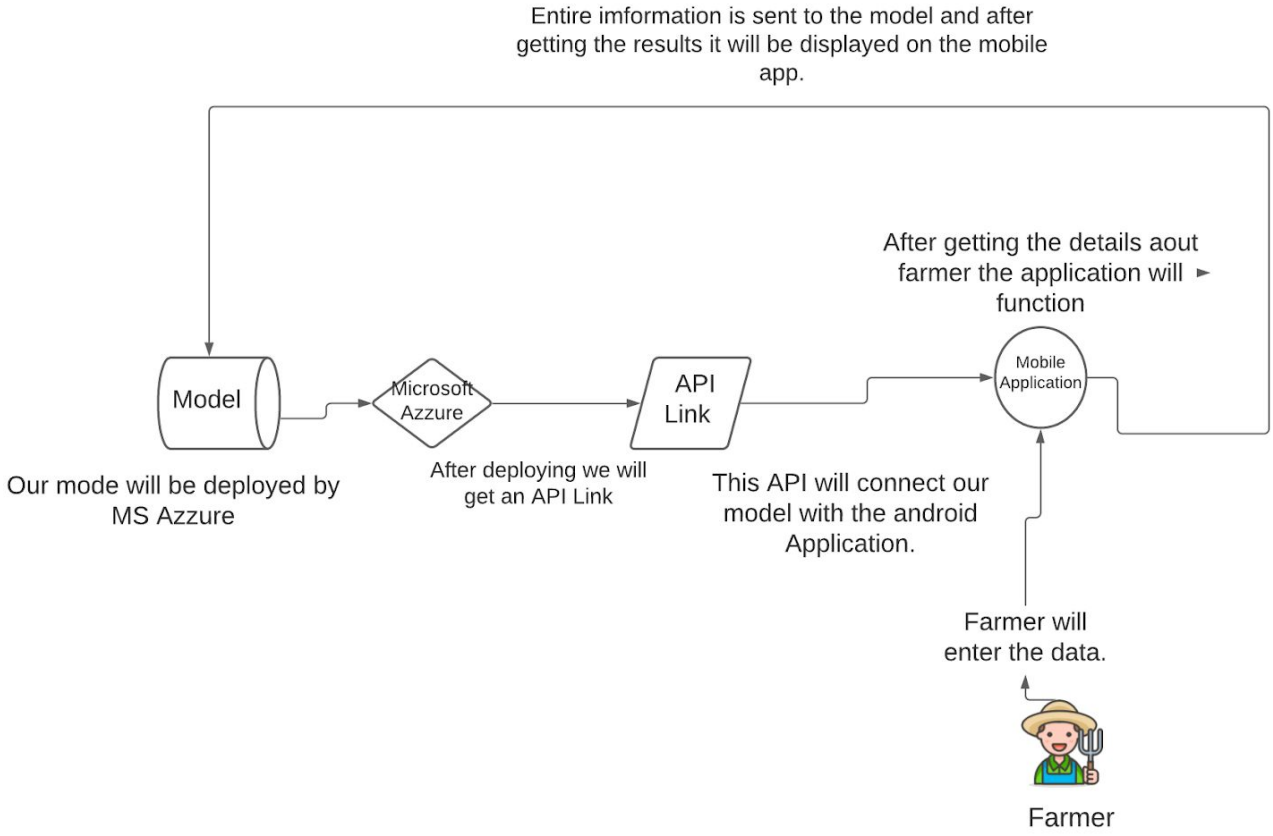
The algorithms we will be using are:

- **Decision Tree algorithm**
- **K-nearest neighbors algorithm**
- **Random forest algorithms**
- **Naive Bayes algorithm**

All these algorithms are used in classification machine learning problems and use different approaches to solve the same problem.

Deployment of the Model:

We will deploy our model on Microsoft azure. After deploying the model we will get an API link which we will be using to connect the model with our mobile application. When the farmer will enter details, they will be fetched and stored in our database. When the app will get the information on the location of the farmer's land it will collect data about the farmer's area through reverse geolocation API and Go weather API. This information will be sent to the model and the model will use the desired inputs and predict the suitable crop for the farmer's land. This predicted result will be shown on the screen of the mobile application.



Our Android Application

We will be designing an android application for a simple and user-friendly interface. With few inputs by the farmer, our application will send the data to the cloud and will analyze the data. Now our trained machine learning model will understand the field requirement as we have trained our machine learning model on various parameters. It will suggest the correct type of crop that must be grown in the field. Based on that, the cloud will send the complete result to the application. Our mobile application will calculate and study the crop and will let the farmer know which is the most suitable crop that he must grow on his fiel

ADD-On Implementation

Disease Detection System

ABSTRACT

From many years farmer facing many problems due to unexpected disease in the field which reduces production and quality of food & also devastate natural ecosystem compounding environmental problems, For this problem in the crop, we have our solution i.e. Farmer will click a picture of infected crop and upload it to our app then app forward this image to the server then this picture is processed by our AI model to identify the diseases in crop and send the information of disease back to the server than through an API android app fetch data and display disease name with biological & chemical control of that disease.

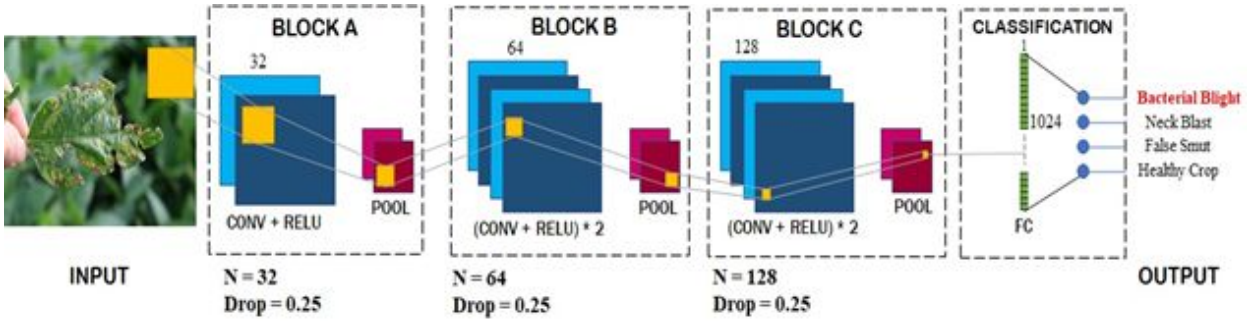


FIG 6 – MODEL ARCHITECTURE

CONCLUSION

Henceforth, it is very useful for all the farmers who have problems with unexpected diseases in crops, and most importantly, we promote made in India components and work on the principle of Digital India.