

Project Topic:Crop Recommendation

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Title of the Project:

Crop Recommendation

Introduction:

Agriculture is the backbone of our country.It plays an important role in day to day life.As we are observing that the farmers are dropping from day to day bcoz may be some lack of awareness,financial problems,crop loss etc...Here I am in front of you to know the main theme of my project.As I am from Agricultural background,I know the importance of a farmer.My father is a farmer.He works daily for the sake of our nation,our lives..My theme is to make awareness among the farmers to cultivate the best crop based upon some conditions..

Objective:

The main objective of my project is to create some awareness among the farmers.Some of the farmers didn't know how to check the soil fertility,nitrogen,potassium....They even think about the reasons behind the crop loss.They simply cultivate the crop and handover to the market.We make some awareness about to check the nitrogen,soil fertility

rate, Growing some multiple crops in the sama area, Consulting the agricultural officers etc...

Goals of the project:

- ❖ Importing the libraries
- ❖ Importing the data set
- ❖ Extracting the data from web
- ❖ Cleaning and preparing the data
- ❖ Checking the redundancy
- ❖ Applying the algorithms
- ❖ Data Visualizations
- ❖ Train the data
- ❖ Checking the accuracy of the trained data and whether it is comes under overfit or underfit
- ❖ Implementing the theme....

Abstract:

The project titled "Crop Recommendation" is done using the libraries Pandas, Numpy, Web scraping, Matplotlib, Sklearn, Scikitlearn... In this we have used DecisionTree algorithm to test the model and predict the crops. After we have given some labeling like Nitrogen, Phosphorous, Potassium, rainfall rate, Temperature we predict the suitable crop based upon the above conditions...

Steps to Train our Model:

Importing the libraries

```
In [52]: #importing Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import tree
from sklearn.tree import DecisionTreeClassifier
import matplotlib.image as pltimg
```

Importing the dataset:

```
#importing dataset
df=pd.read_csv("Crop_recommendation.csv")
df
```

	N	P	K	temperature	humidity	ph	rainfall	label
0	90	42	43	20.879744	82.002744	6.502985	202.935536	rice
1	85	58	41	21.770462	80.319644	7.038096	226.655537	rice
2	60	55	44	23.004459	82.320763	7.840207	263.964248	rice
3	74	35	40	26.491096	80.158363	6.980401	242.864034	rice
4	78	42	42	20.130175	81.604873	7.628473	262.717340	rice
...
2195	107	34	32	26.774637	66.413269	6.780064	177.774507	coffee
2196	99	15	27	27.417112	56.636362	6.086922	127.924610	coffee
2197	118	33	30	24.131797	67.225123	6.362608	173.322839	coffee
2198	117	32	34	26.272418	52.127394	6.758793	127.175293	coffee
2199	104	18	30	23.603016	60.396475	6.779833	140.937041	coffee

2200 rows × 8 columns

Extracting the information from the web:

```
#HEAD:head gives the data from starting to user given ending  
df.head(15)
```

	N	P	K	temperature	humidity	ph	rainfall	label
0	90	42	43	20.879744	82.002744	6.502985	202.935536	rice
1	85	58	41	21.770462	80.319644	7.038096	226.655537	rice
2	60	55	44	23.004459	82.320763	7.840207	263.964248	rice
3	74	35	40	26.491096	80.158363	6.980401	242.864034	rice
4	78	42	42	20.130175	81.604873	7.628473	262.717340	rice
5	69	37	42	23.058049	83.370118	7.073454	251.055000	rice
6	69	55	38	22.708838	82.639414	5.700806	271.324860	rice
7	94	53	40	20.277744	82.894086	5.718627	241.974195	rice
8	89	54	38	24.515881	83.535216	6.685346	230.446236	rice
9	68	58	38	23.223974	83.033227	6.336254	221.209196	rice
10	91	53	40	26.527235	81.417538	5.386168	264.614870	rice
11	90	46	42	23.978982	81.450616	7.502834	250.083234	rice
12	78	58	44	26.800796	80.886848	5.108682	284.436457	rice
13	93	56	36	24.014976	82.056872	6.984354	185.277339	rice
14	94	50	37	25.665852	80.663850	6.948020	209.586971	rice

Data Cleaning and Processing:

```
#DTYPE:dtype gives the data type of columns
df.dtypes
```

```
N          int64
P          int64
K          int64
temperature float64
humidity    float64
ph          float64
rainfall    float64
label       object
dtype: object
```

```
df.isna().sum()
```

```
N          0
P          0
K          0
temperature 0
humidity    0
ph          0
rainfall    0
label       0
dtype: int64
```

```
#SHAPE:shape gives the no.of.columns and rows in dataset
df.shape
```

```
(2200, 8)
```

```
#DESCRIBE:describe gives the mathematical information of columns
df.describe()
```

	N	P	K	temperature	humidity	ph	rainfall
count	2200.000000	2200.000000	2200.000000	2200.000000	2200.000000	2200.000000	2200.000000
mean	50.551818	53.362727	48.149091	25.616244	71.481779	6.469480	103.463655
std	36.917334	32.985883	50.647931	5.063749	22.263812	0.773938	54.958389
min	0.000000	5.000000	5.000000	8.825675	14.258040	3.504752	20.211267
25%	21.000000	28.000000	20.000000	22.769375	60.261953	5.971693	64.551686
50%	37.000000	51.000000	32.000000	25.598693	80.473146	6.425045	94.867624
75%	84.250000	68.000000	49.000000	28.561654	89.948771	6.923643	124.267508
max	140.000000	145.000000	205.000000	43.675493	99.981876	9.935091	298.560117

Train the data and we have to test it:

```
#import sklearn library for train the model
from sklearn.model_selection import train_test_split

#from the dataset here we taking inputs as n,p,k,temperature,hunidity,ph,rainfall
x=np.array(df[['N','P','K','temperature','humidity','ph','rainfall']])

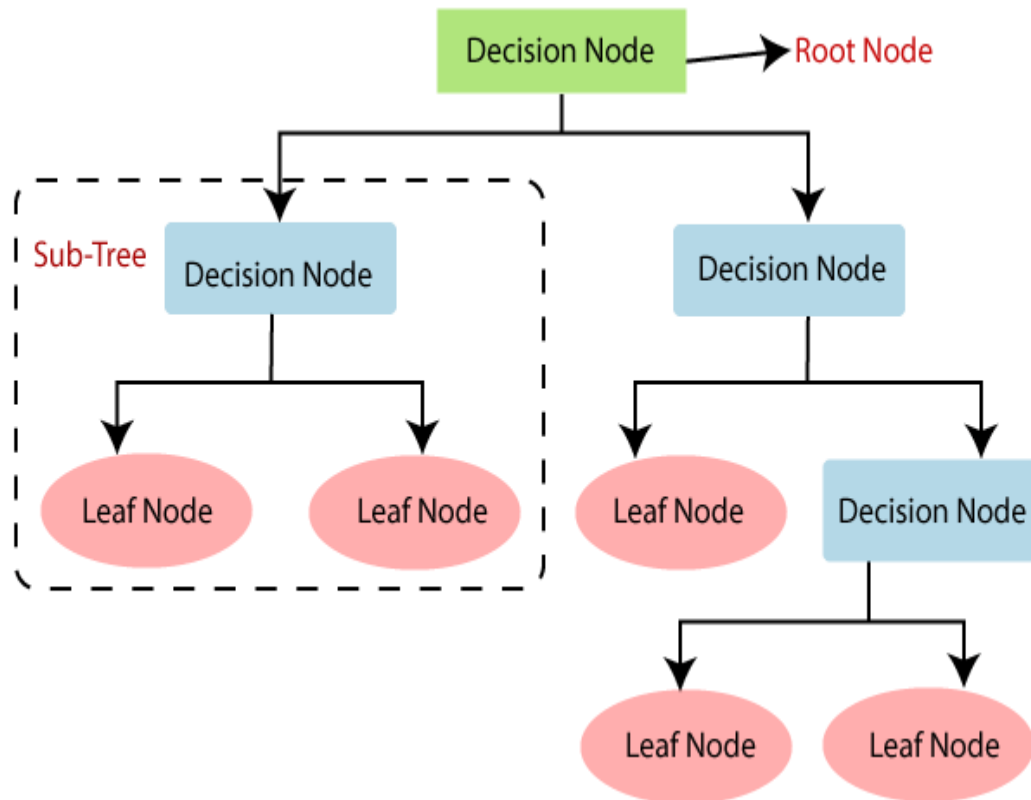
#output
y=np.array(df[["label"]])
```

Applying the Algorithm:

Decision tree is a supervised learning technique that can be used for both classification and regression problems. It is a tree structured classifier. Internal nodes represent features of dataset and branches represent the decision rules.

- Decision trees usually mimic human thinking ability while making a decision, so it is easy to understand..
- The logic behind decision tree can be easily understood because it shows a tree-like structure..
- **How does it works**
- In a decision tree, for predicting the class of the given dataset, the algorithm starts from the root node of the tree. This algorithm compares the values of root attribute with the record (real

- dataset) attribute and, based on the comparison, follows the branch and jumps to the next node.
- For the next node, the algorithm again compares the attribute value with the other sub-nodes and move further. It continues the process until it reaches the leaf node of the tree. The complete process can be better understood using the below Algorithm..




```
#importing trees from sklearn  
from sklearn.tree import DecisionTreeClassifier  
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=3)  
model_dt = DecisionTreeClassifier()
```

```
model_dt.fit(x_train,y_train)
```

```
DecisionTreeClassifier()
```

```
#finding the accuracy of test  
model_dt.score(x_test,y_test)
```

```
0.9886363636363636
```

```
#finding accuracy of train  
model_dt.score(x_train,y_train)
```

```
1.0
```

```
#giving input to predict the output(crop)  
data=np.array([[107,34,32,26.774637,66.413269,6.780064,177.774507]])  
model_dt.predict(data)
```

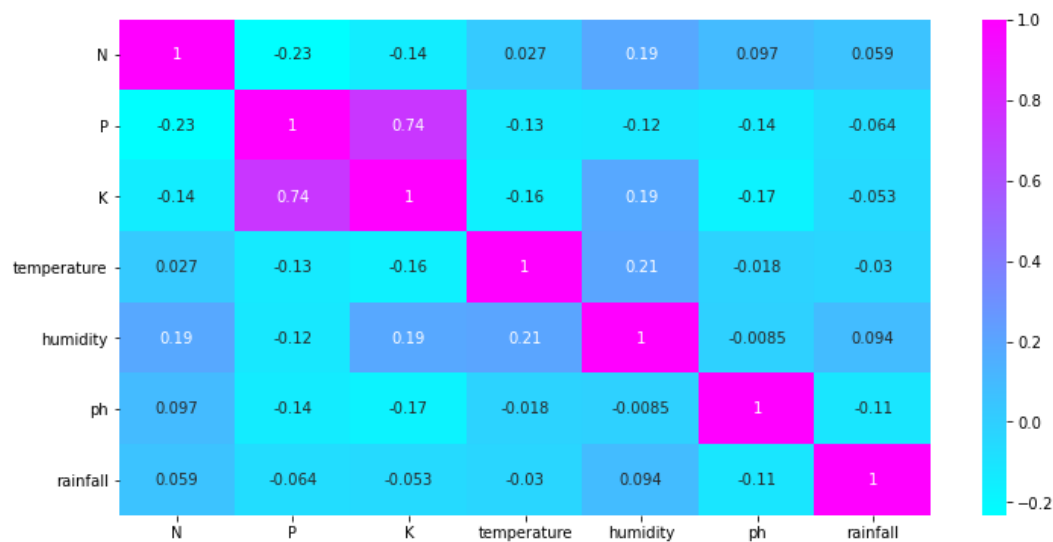
```
array(['coffee'], dtype=object)
```

Graphical Representation:

We use heat map in this project, a heat map is two-dimensional representation of information with help of colors. Heat maps can help the user visualize simple or complex information..

```
figure = plt.figure(figsize=(12, 6))
sns.heatmap(df.corr(), annot=True, cmap=plt.cm.cool)
```

<AxesSubplot:>



Conclusion:

At last, I conclude that Our goal is to create some awareness among the farmers.

We are seeing that most of the farmers are from rural background there are from lack of knowledge. We have to make them as a good cultivator. As of now we have seen some steps to train the model about the crop recommendation. If we want more yield we want to follow some basic things like:

Growing multiple crops

Irrigation techniques

Checking the soil fertility

Cultivation is done based upon the seasonal crops

Climatic conditions etc....

References:

From importing the dataset I refer the website called:Kaggle

From extracting the data:Kaggle.com

From importing and cleaning purpose I

visit:W3Schools.com,JavaTpoint,Real Python.....