

What kind of data does the system learn from ?

This dataset is a dataset of measurements taken for **10** categories of **label**
The **10** different categories of **label** as per the data are:

1.

rice
2.

maize
3.

chickpea
4.

kidneybeans
5.

pigeonpeas
6.

mothbeans
7.

mungbean
8.

blackgram
9.

lentil
10.

pomegranate

The total number of data points is **1000**
A brief preview of the data is as given below:

N	P	K	temperature	humidity	ph	rainfall	label
90	42	43	20.87974371	82.00274423	6.502985292	202.9355362	rice
85	58	41	21.77046169	80.31964408	7.038096361	226.6555374	rice
60	55	44	23.00445915	82.3207629	7.840207144	263.9642476	rice
74	35	40	26.49109635	80.15836264	6.980400905	242.8640342	rice
78	42	42	20.13017482	81.60487287	7.628472891	262.7173405	rice

What are the various features of the data used for model training ?

The various features of the data are:

1.

N
2.

P
3.

K
4.

temperature
5.

humidity
6.

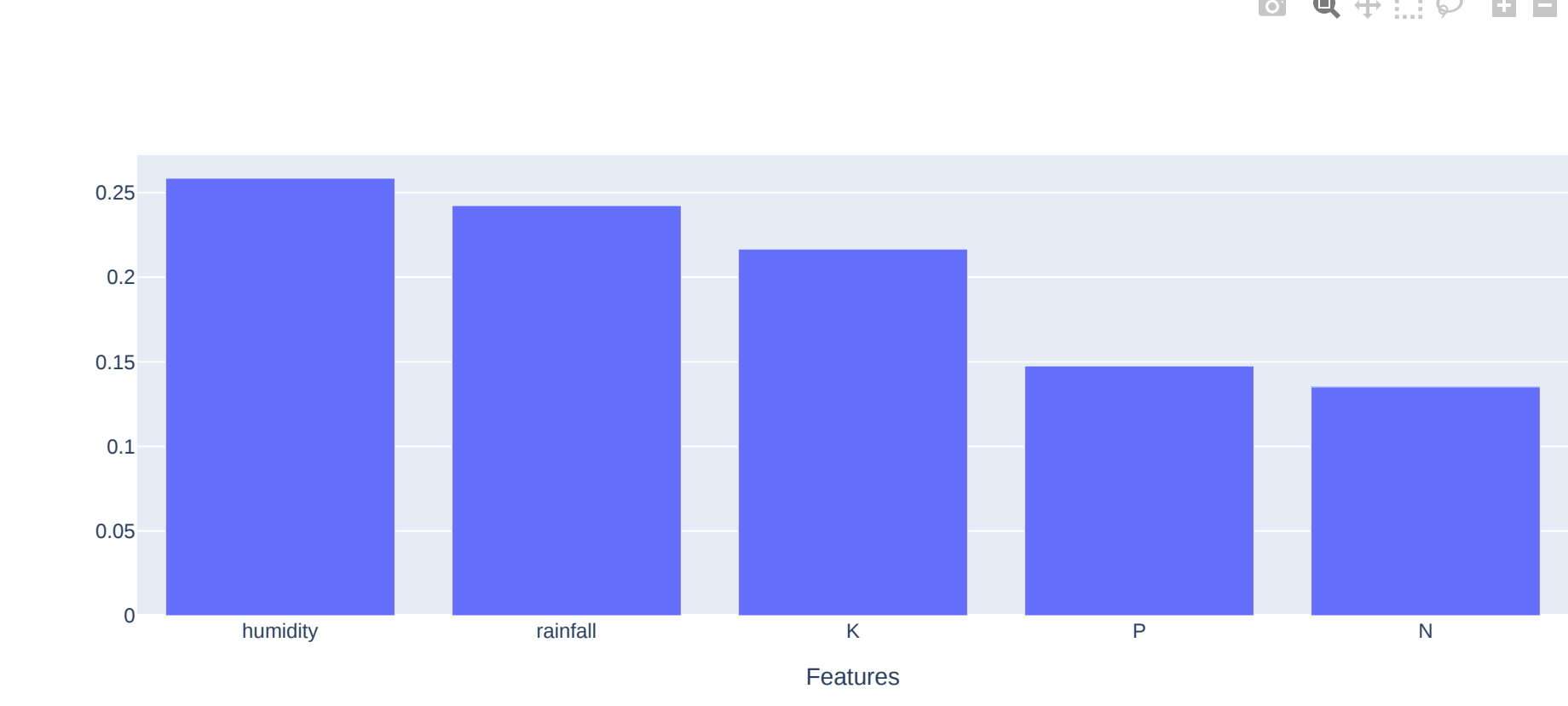
ph
7.

rainfall

The Prediction Process

What does Feature Importance mean ?

Among the 7 features available in the data, the system grades the features based on their importance with respect to the contribution of the features towards the prediction.
The graph below shows the relative importance of the 7 features



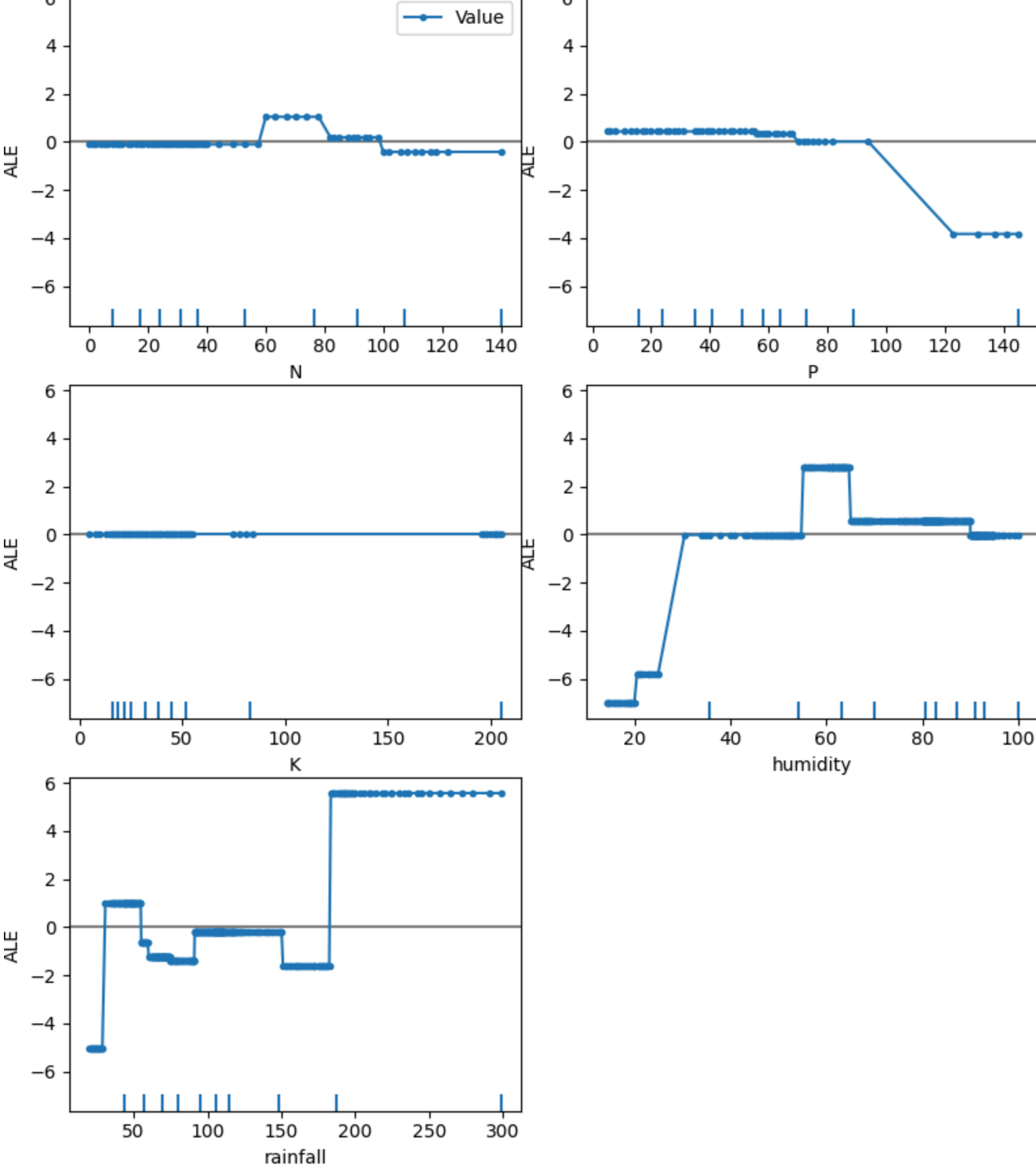
Feature importance refers to the score of input features based on how useful they are at predicting a target variable
As can be seen from the graph above, [humidity, rainfall, 'K', 'P', 'N'] are the contributors to the prediction:

- humidity contributing to 26.0%
- rainfall contributing to 24.0%
- K contributing to 22.0%
- P contributing to 15.0%
- N contributing to 14.0%

Let us look at some of the important features in detail

The ALE value corresponding to that feature value is difference to the mean effect of that feature. Put differently, the ALE value is the relative feature effect on the prediction at that feature value.

This is shown below in the figure as follows ({'apple': 0, 'banana': 1, 'blackgram': 2, 'chickpea': 3, 'coconut': 4, 'coffee': 5, 'cotton': 6, 'grapes': 7, 'jute': 8, 'kidneybeans': 9, 'lentil': 10, 'maize': 11, 'mango': 12, 'mothbeans': 13, 'mungbean': 14,



'muskmelon': 15, 'orange': 16, 'papaya': 17, 'pigeonpeas': 18, 'pomegranate': 19, 'rice': 20, 'watermelon': 21}) :

Let us now look at a specific prediction and understand how the prediction is made

Prediction : apple

N	P	K	humidity	rainfall
0.0	133.0	200.0	90.4935574	104.2298028

Why is this predicted as apple ?

This is predicted as **apple** because the **humidity > 89.91 AND P > 68.00 AND N <= 21.00 AND K > 49.00 AND rainfall > 94.77**

In general, for almost 95% of observations where the **humidity > 89.91 AND P > 68.00 AND N <= 21.00 AND K > 49.00 AND rainfall > 94.77**, the prediction will be **apple**.

Prediction : banana

N	P	K	humidity	rainfall
98.0	79.0	50.0	84.47321314	91.06493353

Why is this predicted as banana ?

This is predicted as **banana** because the **P > 68.00 AND N > 85.00 AND K > 49.00 AND 64.55 < rainfall <= 123.59**

In general, for almost 95% of observations where the **P > 68.00 AND N > 85.00 AND K > 49.00 AND 64.55 < rainfall <= 123.59**, the prediction will be **banana**.

Prediction : blackgram

N	P	K	humidity	rainfall
25.0	62.0	21.0	68.13999721	67.15096376

Why is this predicted as blackgram ?

This is predicted as **blackgram** because the **60.20 < humidity <= 80.54 AND 64.55 < rainfall <= 94.77 AND 51.00 < P <= 68.00 AND N <= 37.00 AND K <= 32.00**

In general, for almost 95% of observations where the **60.20 < humidity <= 80.54 AND 64.55 < rainfall <= 94.77 AND 51.00 < P <= 68.00 AND N <= 37.00 AND K <= 32.00**, the prediction will be **blackgram**.

Prediction : chickpea

N	P	K	humidity	rainfall
25.0	68.0	77.0	15.11279612	85.74904898

Why is this predicted as chickpea ?

This is predicted as **chickpea** because the **P > 28.00 AND K > 49.00 AND humidity <= 60.20 AND 64.55 < rainfall <= 94.77**

In general, for almost 95% of observations where the **P > 28.00 AND K > 49.00 AND humidity <= 60.20 AND 64.55 < rainfall <= 94.77**, the prediction will be **chickpea**.

Prediction : coconut

N	P	K	humidity	rainfall
33.0	14.0	35.0	96.66355213	149.2433497

Why is this predicted as coconut ?

This is predicted as **coconut** because the **rainfall > 123.59 AND humidity > 89.91 AND P <= 28.00 AND K > 20.00 AND N <= 37.00**

In general, for almost 95% of observations where the **rainfall > 123.59 AND humidity > 89.91 AND P <= 28.00 AND K > 20.00 AND N <= 37.00**, the prediction will be **coconut**.

Prediction : coffee

N	P	K	humidity	rainfall
109.0	31.0	27.0	50.40609436	164.4971875

Why is this predicted as coffee ?

This is predicted as **coffee** because the **humidity <= 60.20 AND rainfall > 123.59 AND N > 85.00**

In general, for almost 95% of observations where the **humidity <= 60.20 AND rainfall > 123.59 AND N > 85.00**, the prediction will be **coffee**.

Prediction : cotton

N	P	K	humidity	rainfall
140.0	38.0	15.0	75.88298598	69.91563467

Why is this predicted as cotton ?

This is predicted as **cotton** because the **K <= 20.00 AND N > 85.00 AND 60.20 < humidity <= 89.91 AND 64.55 < rainfall <= 94.77 AND 28.00 < P <= 68.00**

In general, for almost 95% of observations where the **K <= 20.00 AND N > 85.00 AND 60.20 < humidity <= 89.91 AND 64.55 < rainfall <= 94.77 AND 28.00 < P <= 68.00**, the prediction will be **cotton**.

Prediction : grapes

N	P	K	humidity	rainfall
15.0	140.0	195.0	83.54193816	65.8006004

Why is this predicted as grapes ?

This is predicted as **grapes** because the **P > 68.00 AND N <= 21.00 AND K > 49.00 AND 60.20 < humidity <= 89.91 AND 64.55 < rainfall <= 94.77**

In general, for almost 95% of observations where the **P > 68.00 AND N <= 21.00 AND K > 49.00 AND 60.20 < humidity <= 89.91 AND 64.55 < rainfall <= 94.77**, the prediction will be **grapes**.

Prediction : jute

N	P	K	humidity	rainfall
86.0	40.0	39.0	88.16513579	175.6086696999995

Why is this predicted as jute ?

This is predicted as **jute** because the **28.00 < P <= 51.00 AND rainfall > 123.59 AND K > 32.00 AND 60.20 < humidity <= 89.91**

In general, for almost 95% of observations where the **28.00 < P <= 51.00 AND rainfall > 123.59 AND K > 32.00 AND 60.20 < humidity <= 89.91**, the prediction will be **jute**.

Prediction : kidneybeans

N	P	K	humidity	rainfall
13.0	69.0	19.0	20.01730914	115.199245

Why is this predicted as kidneybeans ?

This is predicted as **kidneybeans** because the **humidity <= 60.20 AND K <= 20.00 AND N <= 37.00 AND 94.77 < rainfall <= 123.59 AND P > 68.00**

In general, for almost 95% of observations where the **humidity <= 60.20 AND K <= 20.00 AND N <= 37.00 AND 94.77 < rainfall <= 123.59 AND P > 68.00**, the prediction will be **kidneybeans**.

Prediction : lentil

N	P	K	humidity	rainfall
19.0	79.0	19.0	67.76252583	42.89509057

Why is this predicted as lentil ?

This is predicted as **lentil** because the **rainfall <= 64.55 AND P > 68.00 AND 60.20 < humidity <= 80.54 AND N <= 21.00 AND K <= 32.00**

In general, for almost 95% of observations where the **rainfall <= 64.55 AND P > 68.00 AND 60.20 < humidity <= 80.54 AND N <= 21.00 AND K <= 32.00**, the prediction will be **lentil**.

Prediction : maize

N	P	K	humidity	rainfall
71.0	54.0	16.0	63.69070564	87.75953857

Why is this predicted as maize ?

This is predicted as **maize** because the **37.00 < N <= 85.00 AND K <= 20.00 AND humidity <= 80.54 AND 64.55 < rainfall <= 123.59 AND 28.00 < P <= 68.00**

In general, for almost 95% of observations where the **37.00 < N <= 85.00 AND K <= 20.00 AND humidity <= 80.54 AND 64.55 < rainfall <= 123.59 AND 28.00 < P <= 68.00**, the prediction will be **maize**.

Prediction : mango

N	P	K	humidity	rainfall
36.0	26.0	26.0	51.0845903	95.23444287

Why is this predicted as mango ?

This is predicted as **mango** because the **humidity <= 60.20 AND P <= 28.00 AND N <= 37.00 AND 94.77 < rainfall <= 123.59 AND 20.00 < K <= 32.00**

In general, for almost 95% of observations where the **humidity <= 60.20 AND P <= 28.00 AND N <= 37.00 AND 94.77 < rainfall <= 123.59 AND 20.00 < K <= 32.00**, the prediction will be **mango**.

Prediction : mothbeans

N	P	K	humidity	rainfall
32.0	48.0	18.0	56.40226277	64.16167699

Why is this predicted as mothbeans ?

This is predicted as **mothbeans** because the **rainfall <= 64.55 AND humidity <= 60.20 AND 21.00 < N <= 37.00 AND 28.00 < P <= 51.00 AND K <= 32.00**

In general, for almost 95% of observations where the **rainfall <= 64.55 AND humidity <= 60.20 AND 21.00 < N <= 37.00 AND 28.00 < P <= 51.00 AND K <= 32.00**, the prediction will be **mothbeans**.

Prediction : mungbean

N	P	K	humidity	rainfall
4.0	44.0	19.0	83.52706038	43.25726752

Why is this predicted as mungbean ?

This is predicted as **mungbean** because the **80.54 < humidity <= 89.91 AND rainfall <= 64.55 AND K <= 32.00 AND N <= 21.00 AND P <= 51.00**

In general, for almost 95% of observations where the **80.54 < humidity <= 89.91 AND rainfall <= 64.55 AND K <= 32.00 AND N <= 21.00 AND P <= 51.00**, the prediction will be **mungbean**.

Prediction : muskmelon

N	P	K	humidity	rainfall
89.0	9.0	47.0	90.77069618	28.75226067

Why is this predicted as muskmelon ?

This is predicted as **muskmelon** because the **rainfall <= 64.55 AND humidity > 89.91 AND N > 85.00 AND 32.00 < K <= 49.00 AND P <= 68.00**

In general, for almost 95% of observations where the **rainfall <= 64.55 AND humidity > 89.91 AND N > 85.00 AND 32.00 < K <= 49.00 AND P <= 68.00**, the prediction will be **muskmelon**.

Prediction : orange

N	P	K	humidity	rainfall
13.0	23.0	6.0	90.26408017	102.6958703

Why is this predicted as orange ?

This is predicted as **orange** because the **humidity > 89.91 AND K <= 20.00 AND P <= 28.00 AND 64.55 < rainfall <= 123.59 AND N <= 21.00**

In general, for almost 95% of observations where the **humidity > 89.91 AND K <= 20.00 AND P <= 28.00 AND 64.55 < rainfall <= 123.59 AND N <= 21.00**, the prediction will be **orange**.

Prediction : papaya

N	P	K	humidity	rainfall
49.0	55.0	53.0	93.63739039	77.71566883

Why is this predicted as papaya ?

This is predicted as **papaya** because the **humidity > 89.91 AND K > 49.00 AND N <= 85.00 AND 51.00 < P <= 68.00**

In general, for almost 95% of observations where the **humidity > 89.91 AND K > 49.00 AND N <= 85.00 AND 51.00 < P <= 68.00**, the prediction will be **papaya**.

Prediction : pigeonpeas

N	P	K	humidity	rainfall
30.0	75.0	25.0	42.35249879	149.299952

Why is this predicted as pigeonpeas ?

This is predicted as **pigeonpeas** because the **rainfall > 123.59 AND K <= 32.00 AND P > 68.00 AND N <= 37.00 AND humidity <= 80.54**

In general, for almost 95% of observations where the **rainfall > 123.59 AND K <= 32.00 AND P > 68.00 AND N <= 37.00 AND humidity <= 80.54**, the prediction will be **pigeonpeas**.

Prediction : pomegranate

N	P	K	humidity	rainfall
6.0	18.0	37.0	89.93701023	108.0458926

Why is this predicted as pomegranate ?

This is predicted as **pomegranate** because the **P <= 28.00 AND K > 32.00 AND N <= 21.00 AND humidity > 80.54 AND 64.55 < rainfall <= 123.59**

In general, for almost 95% of observations where the **P <= 28.00 AND K > 32.00 AND N <= 21.00 AND humidity > 80.54 AND 64.55 < rainfall <= 123.59**, the prediction will be **pomegranate**.

Prediction : rice

N	P	K	humidity	rainfall
60.0	49.0	44.0	84.49774397	240.0810647

Why is this predicted as rice ?

This is predicted as **rice** because the **rainfall > 123.59 AND 80.54 < humidity <= 89.91 AND 28.00 < P <= 51.00 AND N <= 85.00 AND K <= 49.00**

In general, for almost 95% of observations where the **rainfall > 123.59 AND 80.54 < humidity <= 89.91 AND 28.00 < P <= 51.00 AND N <= 85.00 AND K <= 49.00**, the prediction will be **rice**.

Prediction : watermelon

N	P	K	humidity	rainfall
100.0	10.0	53.0	84.60808277	42.00660251

Why is this predicted as watermelon ?

This is predicted as **watermelon** because the **rainfall <= 64.55 AND N > 85.00 AND P <= 28.00 AND K > 49.00 AND 80.54 < humidity <= 89.91**

In general, for almost 95% of observations where the **rainfall <= 64.55 AND N > 85.00 AND P <= 28.00 AND K > 49.00 AND 80.54 < humidity <= 89.91**, the prediction will be **watermelon**.