Crop and Fertilizer Recommandation System using ML

In [ ]:
```
# Importing necessary libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:
```
#Loading the dataset
crop = pd.read_csv("Crop_recommendation.csv")
```

In [ ]:
```
crop.head()
```

Out[ ]:

	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

In [ ]:
```
crop.shape
```

Out[ ]:
```
(2200, 8)
```

In [ ]:
```
crop.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2200 entries, 0 to 2199
Data columns (total 8 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   N            2200 non-null   int64  
 1   P            2200 non-null   int64  
 2   K            2200 non-null   int64  
 3   temperature  2200 non-null   float64
 4   humidity     2200 non-null   float64
 5   ph           2200 non-null   float64
 6   rainfall     2200 non-null   float64
 7   label        2200 non-null   object 
dtypes: float64(4), int64(3), object(1)
memory usage: 137.6+ KB
```

In [ ]:
```
# to check the missing values
crop.isnull().sum()
```

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

In [ ]:
```
# to check duplicate values
crop.duplicated().sum()
```

Out[ ]:
```
np.int64(0)
```

In [ ]:
```
#to check the statistics of the dataset
crop.describe()
```

Out[ ]:

	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

In [ ]:
```
# Check the target feature distribution
crop['label'].value_counts()
```

Out[ ]:
```
label
rice           100
maize          100
chickpea       100
kidneybeans    100
pigeonpeas     100
mothbeans      100
mungbean       100
blackgram      100
lentil         100
pomegranate    100
banana         100
mango          100
grapes         100
watermelon     100
muskmelon      100
apple          100
orange         100
papaya         100
coconut        100
cotton         100
jute           100
coffee         100
Name: count, dtype: int64
```

In [ ]:
```
pip install seaborn
```

```
Requirement already satisfied: seaborn in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (0.13.2)Note: you may need to restart the kernel to use updated packages.

Requirement already satisfied: numpy!=1.24.0,>=1.20 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from seaborn) (2.2.2)
Requirement already satisfied: pandas>=1.2 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from seaborn) (2.2.3)
Requirement already satisfied: matplotlib!=3.6.1,>=3.4 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from seaborn) (3.10.0)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (1.3.1)
Requirement already satisfied: cycler>=0.10 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (4.55.5)
Requirement already satisfied: kiwisolver>=1.3.1 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (1.4.8)
Requirement already satisfied: packaging>=20.0 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (24.2)
Requirement already satisfied: pillow>=8 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (11.1.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (3.2.1)
Requirement already satisfied: python-dateutil>=2.7 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from matplotlib!=3.6.1,>=3.4->seaborn) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from pandas>=1.2->seaborn) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from pandas>=1.2->seaborn) (2025.1)
Requirement already satisfied: six>=1.5 in c:\users\shiva\appdata\local\programs\python\python312\lib\site-packages (from python-dateutil>=2.7->matplotlib!=3.6.1,>=3.4->seaborn) (1.17.0)
```