```python
In [1]:   import numpy as np
          import pandas as pd
          from matplotlib import pyplot as plt
          from sklearn.neighbors import KNeighborsClassifier
          from sklearn.model_selection import train_test_split
```

```python
In [2]:   !pip install scikit-learn
```

```
Requirement already satisfied: scikit-learn in c:\users\admin\anaconda3\lib\site-packages (0.24.2)
Requirement already satisfied: joblib>=0.11 in c:\users\admin\anaconda3\lib\site-packages (from scikit-learn) (1.
1.0)
Requirement already satisfied: scipy>=0.19.1 in c:\users\admin\anaconda3\lib\site-packages (from scikit-learn) (1
.7.1)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\admin\anaconda3\lib\site-packages (from scikit-le
arn) (2.2.0)
Requirement already satisfied: numpy>=1.13.3 in c:\users\admin\anaconda3\lib\site-packages (from scikit-learn) (1
.20.3)
```

```python
In [23]:  df = pd.read_csv( "C:\\Users\\ADMIN\\Downloads\\archive\\iris.data.csv", names=['a', 'b', 'c', 'd', 'class'])
          df
```

Out[23]:

	a	b	c	d	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 5 columns

```python
In [24]:  df.head()
```

Out[24]:

	a	b	c	d	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

```python
In [25]:  df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   a       150 non-null    float64
 1   b       150 non-null    float64
 2   c       150 non-null    float64
 3   d       150 non-null    float64
 4   class   150 non-null    object
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

```python
In [26]:  features = df.iloc[:, :-1].values
```

```python
labels = df.iloc[:, -1].values
```

In [27]:
```python
features,labels
```

Out[27]:
```
(array([[5.1, 3.5, 1.4, 0.2],
        [4.9, 3. , 1.4, 0.2],
        [4.7, 3.2, 1.3, 0.2],
        [4.6, 3.1, 1.5, 0.2],
        [5. , 3.6, 1.4, 0.2],
        [5.4, 3.9, 1.7, 0.4],
        [4.6, 3.4, 1.4, 0.3],
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        [4.4, 2.9, 1.4, 0.2],
        [4.9, 3.1, 1.5, 0.1],
        [5.4, 3.7, 1.5, 0.2],
        [4.8, 3.4, 1.6, 0.2],
        [4.8, 3. , 1.4, 0.1],
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        [5.8, 4. , 1.2, 0.2],
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        [5.4, 3.9, 1.3, 0.4],
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        [6.9, 3.1, 4.9, 1.5],
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        [5.7, 2.6, 3.5, 1. ],
        [5.5, 2.4, 3.8, 1.1],
        [5.5, 2.4, 3.7, 1. ],
        [5.8, 2.7, 3.9, 1.2],
```

```
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       [6.3, 2.9, 5.6, 1.8],
       [6.5, 3. , 5.8, 2.2],
       [7.6, 3. , 6.6, 2.1],
       [4.9, 2.5, 4.5, 1.7],
       [7.3, 2.9, 6.3, 1.8],
       [6.7, 2.5, 5.8, 1.8],
       [7.2, 3.6, 6.1, 2.5],
       [6.5, 3.2, 5.1, 2. ],
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       [6.8, 3. , 5.5, 2.1],
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       [6.1, 3. , 4.9, 1.8],
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       [6.3, 3.4, 5.6, 2.4],
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       [6.7, 3.1, 5.6, 2.4],
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       [5.8, 2.7, 5.1, 1.9],
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       [6.7, 3. , 5.2, 2.3],
       [6.3, 2.5, 5. , 1.9],
       [6.5, 3. , 5.2, 2. ],
       [6.2, 3.4, 5.4, 2.3],
       [5.9, 3. , 5.1, 1.8]]),
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        'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
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        'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
        'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
        'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
        'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
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        'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
        'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
```

```
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                    'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
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                    'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
                    'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
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                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
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                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
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                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
                    'Iris-virginica', 'Iris-virginica'], dtype=object))
```

In [28]:
```python
from sklearn.model_selection import train_test_split
```

In [29]:
```python
X_train, X_test, Y_train, Y_test = train_test_split(features, labels, test_size=0.3)
```

In [30]:
```python
X_train, X_test, Y_train, Y_test
```

Out[30]:
```
(array([[5.6, 2.9, 3.6, 1.3],
        [5.4, 3.4, 1.5, 0.4],
        [5.1, 3.4, 1.5, 0.2],
        [5.7, 2.5, 5. , 2. ],
        [4.8, 3. , 1.4, 0.1],
        [6. , 2.2, 5. , 1.5],
        [6.4, 2.8, 5.6, 2.1],
        [5.7, 2.8, 4.5, 1.3],
        [5.5, 3.5, 1.3, 0.2],
        [6.3, 2.9, 5.6, 1.8],
        [6.7, 3. , 5.2, 2.3],
        [7.7, 2.6, 6.9, 2.3],
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        [6. , 2.2, 4. , 1. ],
        [6. , 3. , 4.8, 1.8],
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        [7. , 3.2, 4.7, 1.4],
```

```
              [5. , 3.4, 1.6, 0.4],
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```

```
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            [6.4, 3.2, 5.3, 2.3],
            [4.7, 3.2, 1.3, 0.2],
            [5.1, 3.8, 1.5, 0.3],
            [6.9, 3.1, 5.4, 2.1],
            [5.5, 2.4, 3.7, 1. ]]),
    array(['Iris-versicolor', 'Iris-setosa', 'Iris-setosa', 'Iris-virginica',
           'Iris-setosa', 'Iris-virginica', 'Iris-virginica',
           'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
           'Iris-virginica', 'Iris-virginica', 'Iris-setosa',
           'Iris-virginica', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
           'Iris-setosa', 'Iris-versicolor', 'Iris-virginica',
           'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa',
           'Iris-virginica', 'Iris-versicolor', 'Iris-virginica',
           'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
           'Iris-setosa', 'Iris-virginica', 'Iris-virginica',
           'Iris-virginica', 'Iris-setosa', 'Iris-virginica',
           'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-versicolor', 'Iris-virginica',
           'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
           'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
           'Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
           'Iris-versicolor', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
           'Iris-virginica', 'Iris-versicolor', 'Iris-virginica',
           'Iris-versicolor', 'Iris-virginica', 'Iris-setosa',
           'Iris-virginica', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
           'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa',
           'Iris-virginica', 'Iris-versicolor', 'Iris-virginica',
           'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
           'Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
           'Iris-versicolor', 'Iris-virginica', 'Iris-setosa',
           'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
           'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
           'Iris-virginica', 'Iris-virginica', 'Iris-versicolor',
           'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
           'Iris-setosa', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
           'Iris-setosa', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
           'Iris-virginica'], dtype=object),
    array(['Iris-setosa', 'Iris-setosa', 'Iris-versicolor', 'Iris-setosa',
           'Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
           'Iris-virginica', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-virginica', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
           'Iris-setosa', 'Iris-setosa', 'Iris-versicolor', 'Iris-virginica',
           'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
           'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
           'Iris-setosa', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
           'Iris-setosa', 'Iris-virginica', 'Iris-versicolor'], dtype=object))
```
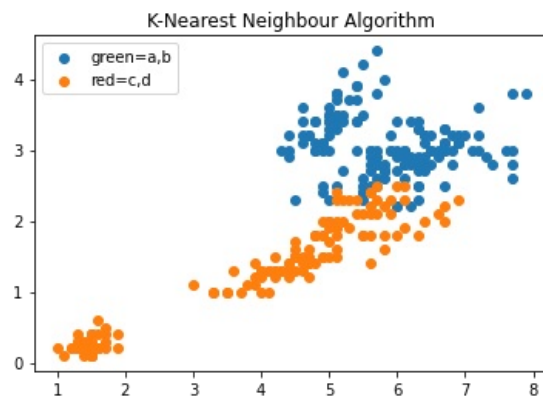
In [31]:
```python
X_train.shape, X_test.shape, Y_train.shape, Y_test.shape
```

Out[31]:
```
((105, 4), (45, 4), (105,), (45,))
```

In [32]:
```python
knn = KNeighborsClassifier()
knn.fit(X_train, Y_train)
```

Out[32]:
```
KNeighborsClassifier()
```

In [33]:
```python
y_pred = knn.predict(X_test)
y_pred
```

Out[33]:
```
array(['Iris-setosa', 'Iris-setosa', 'Iris-versicolor', 'Iris-setosa',
       'Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-virginica', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-versicolor', 'Iris-virginica',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
```

```
            'Iris-setosa', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
            'Iris-setosa', 'Iris-virginica', 'Iris-versicolor'], dtype=object)
```

In [34]:
```python
# Accuracy_score
from sklearn.metrics import accuracy_score
accuracy_score(Y_test,y_pred)
```

Out[34]: 1.0

In [35]:
```python
### Classification report
from sklearn.metrics import classification_report
print(classification_report(y_pred, Y_test))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        20
Iris-versicolor       1.00      1.00      1.00        16
 Iris-virginica       1.00      1.00      1.00         9

       accuracy                           1.00        45
      macro avg       1.00      1.00      1.00        45
   weighted avg       1.00      1.00      1.00        45
```

In [38]:
```python
##### Data visualization

x_val = df['a']
y_val = df['b']
x1_val = df['c']
y1_val= df['d']
plt.scatter(x_val,y_val,label='green=a,b') # for original values
plt.scatter(x1_val,y1_val,label='red=c,d') # for predicted values
plt.title("K-Nearest Neighbour Algorithm")
plt.legend()
plt.show()
```


In [ ]: