EXPERIMENT NO: 8

Iris Flower Classification using K-Nearest Neighbors (KNN)

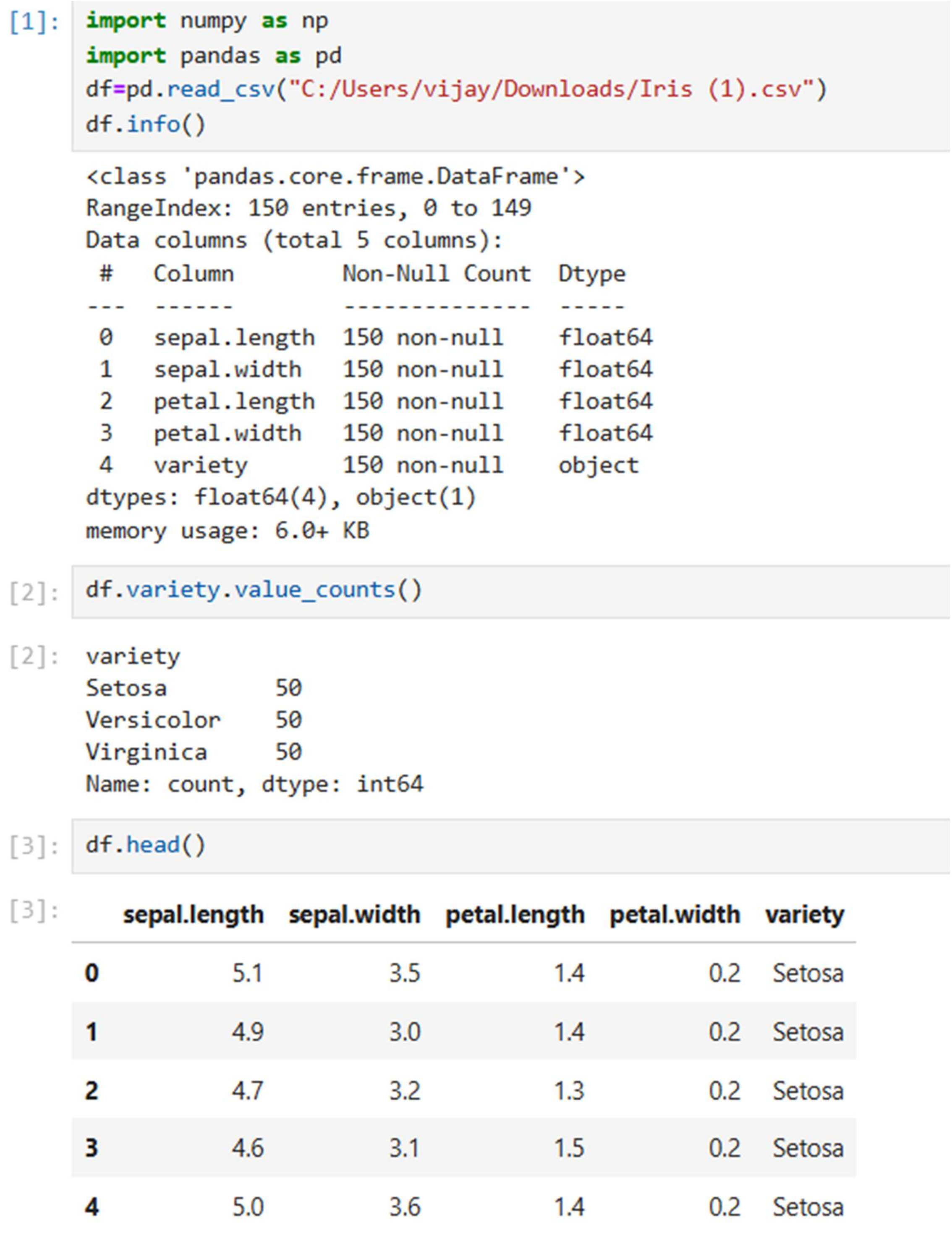
Aim:

To classify Iris flower species based on their sepal and petal measurements using the K-Nearest Neighbors algorithm.

Algorithm:

1. **Load Data: Read the Iris dataset using pandas.**
2. **Explore Data: Check data info, count species, and display sample records.**
3. **Split Data: Separate features (measurements) and labels (species).**
4. **Train-Test Split: Divide data into 80% training and 20% testing sets.**
5. **Model Training: Initialize KNN with 5 neighbors and fit it on training data.**
6. **Evaluate Model: Display training and testing accuracy scores.**
7. **Performance Metrics: Generate and print confusion matrix and classification report.**

Program:



```
[1]: import numpy as np
     import pandas as pd
     df=pd.read_csv("C:/Users/vijay/Downloads/Iris (1).csv")
     df.info()
```

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

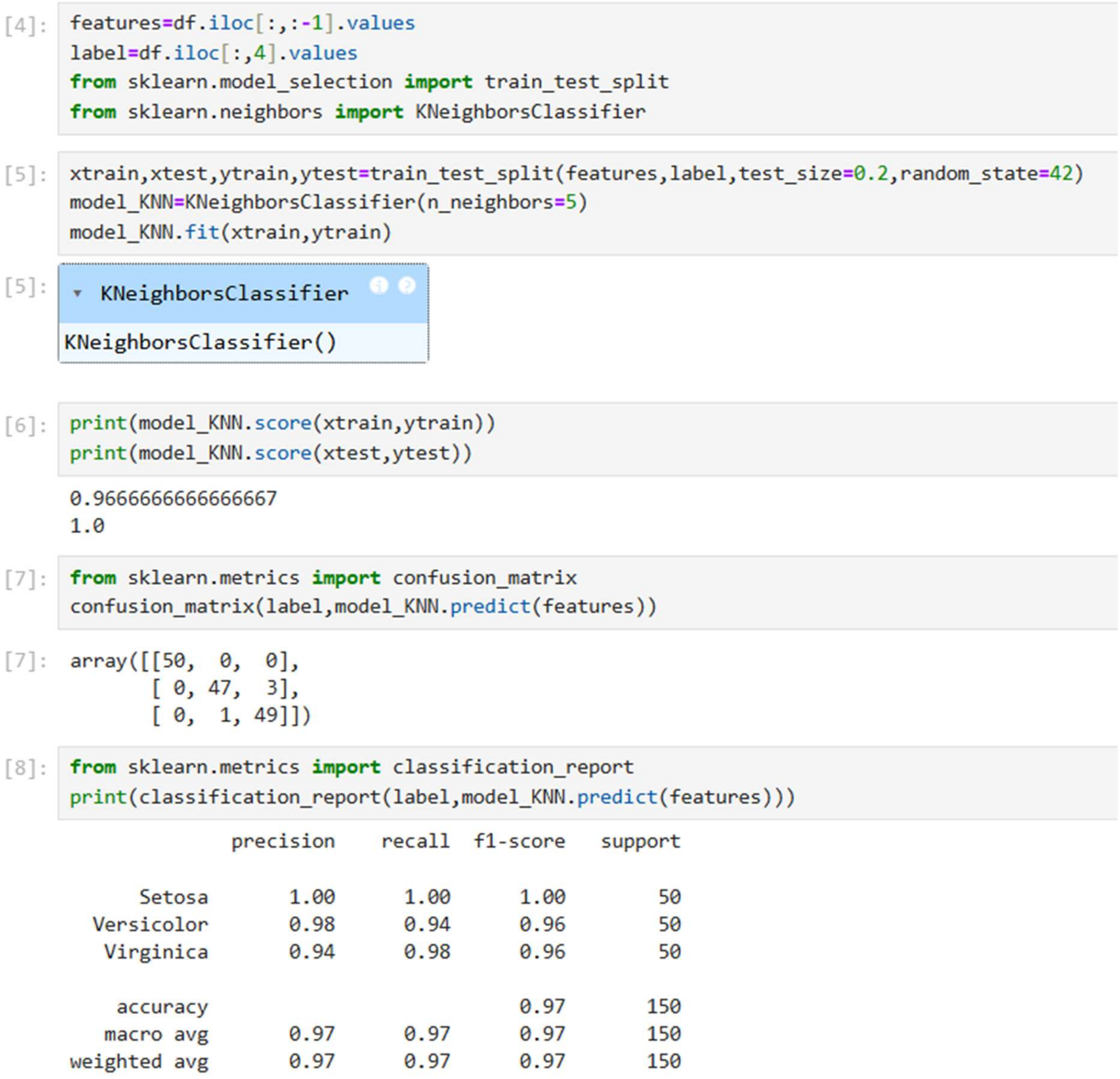
```
[2]: df.variety.value_counts()
```

```
[2]: variety
     Setosa        50
     Versicolor    50
     Virginica     50
     Name: count, dtype: int64
```

```
[3]: df.head()
```

[3]:

	sepal.length	sepal.width	petal.length	petal.width	variety
0	5.1	3.5	1.4	0.2	Setosa
1	4.9	3.0	1.4	0.2	Setosa
2	4.7	3.2	1.3	0.2	Setosa
3	4.6	3.1	1.5	0.2	Setosa
4	5.0	3.6	1.4	0.2	Setosa



```
[4]: features=df.iloc[:,:-1].values
     label=df.iloc[:,4].values
     from sklearn.model_selection import train_test_split
     from sklearn.neighbors import KNeighborsClassifier

[5]: xtrain,xtest,ytrain,ytest=train_test_split(features,label,test_size=0.2,random_state=42)
     model_KNN=KNeighborsClassifier(n_neighbors=5)
     model_KNN.fit(xtrain,ytrain)

[5]: ▾ KNeighborsClassifier
     KNeighborsClassifier()

[6]: print(model_KNN.score(xtrain,ytrain))
     print(model_KNN.score(xtest,ytest))

     0.9666666666666667
     1.0

[7]: from sklearn.metrics import confusion_matrix
     confusion_matrix(label,model_KNN.predict(features))

[7]: array([[50,  0,  0],
            [ 0, 47,  3],
            [ 0,  1, 49]])

[8]: from sklearn.metrics import classification_report
     print(classification_report(label,model_KNN.predict(features)))

                   precision    recall  f1-score   support

          Setosa       1.00      1.00      1.00        50
      Versicolor       0.98      0.94      0.96        50
       Virginica       0.94      0.98      0.96        50

        accuracy                           0.97       150
       macro avg       0.97      0.97      0.97       150
    weighted avg       0.97      0.97      0.97       150
```

Result:

The KNN model successfully classifies Iris flowers into their respective species with high accuracy. The confusion matrix and classification report confirm that the model performs well with minimal misclassifications.