Assignment 2 Report

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Work Done for Sections

Section 1

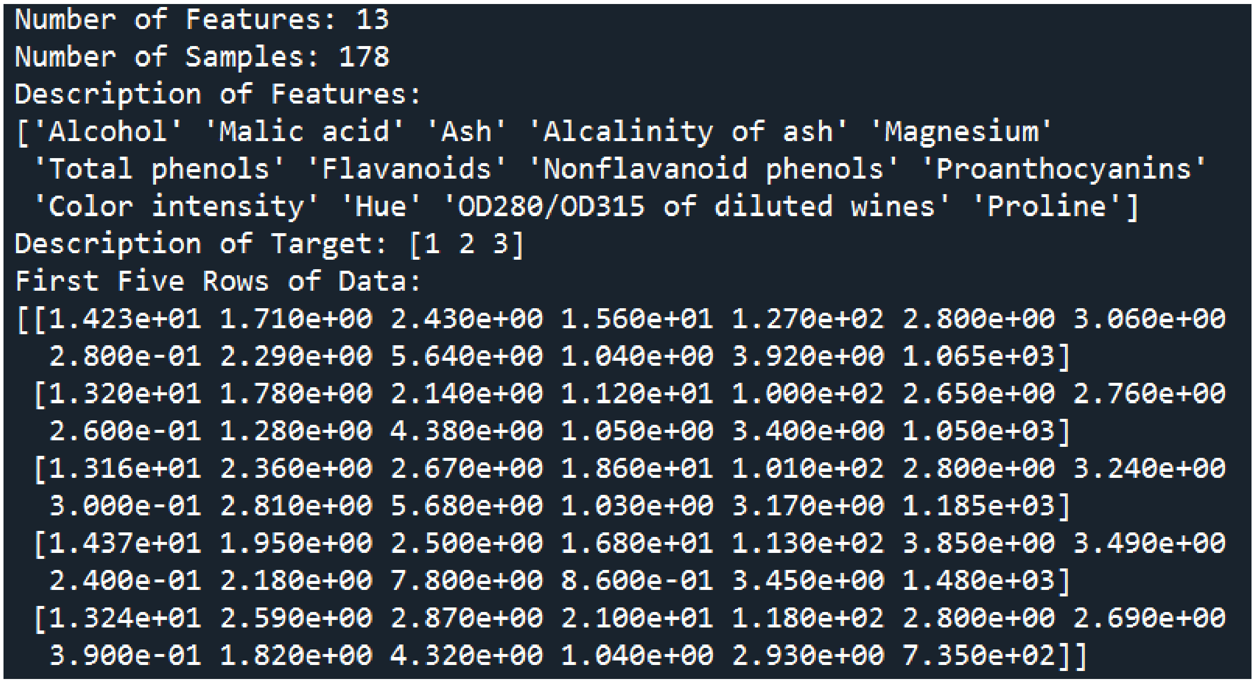
For our assignment we chose to use the wine data set that was given from the three options.

Section 2

For part 2 we created a python file that reads the data from the csv file and returns the following. We used Pandas to load a CSV. The load function assumes that the first column is always the feature name since that was the case for the Wine dataset. The Python file for this is *csvreader.py*. This file mostly functions as a library file, per the instructions, however, you can choose to run it independently and it will ask to be supplied the name of a file to read.

Section 3

This table shows the required information about the data. This information, as well as the charts, were generated by the *meet_the_data.py* script. This was the output.

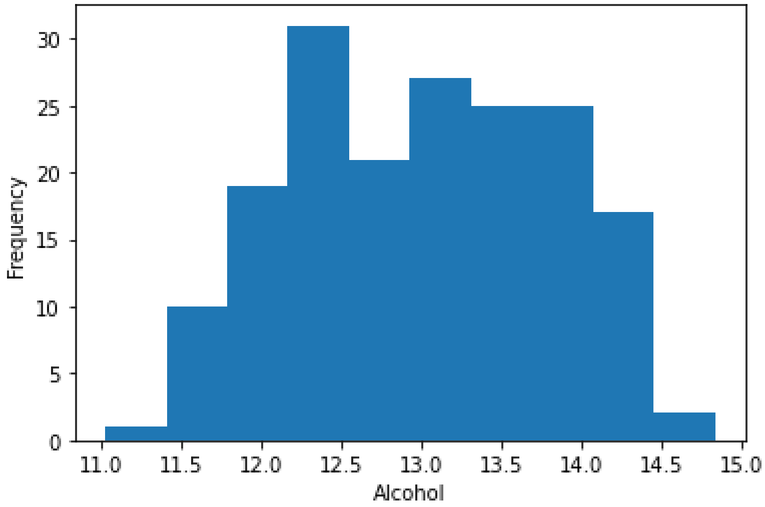


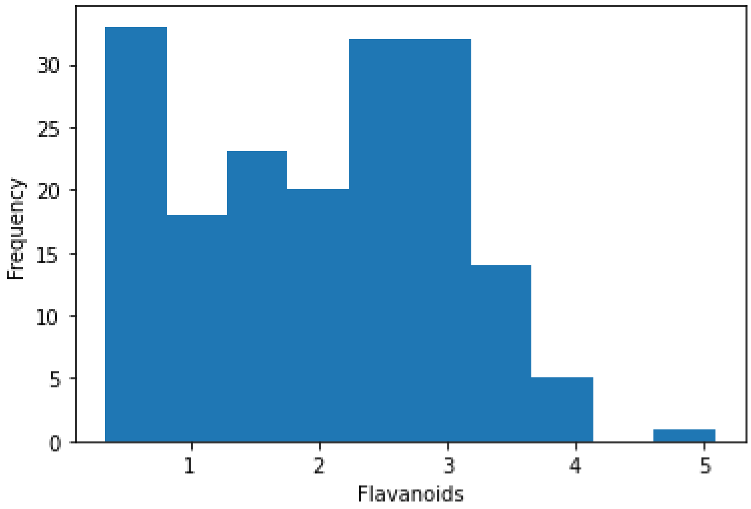
```
Number of Features: 13
Number of Samples: 178
Description of Features:
['Alcohol' 'Malic acid' 'Ash' 'Alcalinity of ash' 'Magnesium'
 'Total phenols' 'Flavanoids' 'Nonflavanoid phenols' 'Proanthocyanins'
 'Color intensity' 'Hue' 'OD280/OD315 of diluted wines' 'Proline']
Description of Target: [1 2 3]
First Five Rows of Data:
[[1.423e+01 1.710e+00 2.430e+00 1.560e+01 1.270e+02 2.800e+00 3.060e+00
  2.800e-01 2.290e+00 5.640e+00 1.040e+00 3.920e+00 1.065e+03]
 [1.320e+01 1.780e+00 2.140e+00 1.120e+01 1.000e+02 2.650e+00 2.760e+00
  2.600e-01 1.280e+00 4.380e+00 1.050e+00 3.400e+00 1.050e+03]
 [1.316e+01 2.360e+00 2.670e+00 1.860e+01 1.010e+02 2.800e+00 3.240e+00
  3.000e-01 2.810e+00 5.680e+00 1.030e+00 3.170e+00 1.185e+03]
 [1.437e+01 1.950e+00 2.500e+00 1.680e+01 1.130e+02 3.850e+00 3.490e+00
  2.400e-01 2.180e+00 7.800e+00 8.600e-01 3.450e+00 1.480e+03]
 [1.324e+01 2.590e+00 2.870e+00 2.100e+01 1.180e+02 2.800e+00 2.690e+00
  3.900e-01 1.820e+00 4.320e+00 1.040e+00 2.930e+00 7.350e+02]]
```

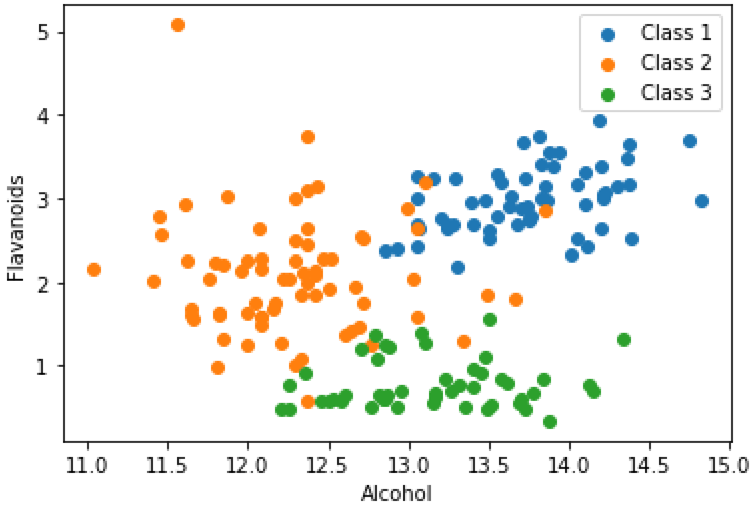
Number of features	13
Number of samples	178

Description of features	Alcohol, Malic Acid, Ash, Alcalinity of Ash, Magnesium, Total Phenols, Flavanoids, Nonflavanoid Phenols, Proanthocyanidins, Color intensity, Hue, OD280/OD315 of diluted windes, Proline
Description of target	[1 2 3]
First five rows of data	[[1.423e+01 1.710e+00 2.430e+00 1.560e+01 1.270e+02 2.800e+00 3.060e+00 2.800e-01 2.290e+00 5.640e+00 1.040e+00 3.920e+00 1.065e+03] [1.320e+01 1.780e+00 2.140e+00 1.120e+01 1.000e+02 2.650e+00 2.760e+00 2.600e-01 1.280e+00 4.380e+00 1.050e+00 3.400e+00 1.050e+03] [1.316e+01 2.360e+00 2.670e+00 1.860e+01 1.010e+02 2.800e+00 3.240e+00 3.000e-01 2.810e+00 5.680e+00 1.030e+00 3.170e+00 1.185e+03] [1.437e+01 1.950e+00 2.500e+00 1.680e+01 1.130e+02 3.850e+00 3.490e+00 2.400e-01 2.180e+00 7.800e+00 8.600e-01 3.450e+00 1.480e+03] [1.324e+01 2.590e+00 2.870e+00 2.100e+01 1.180e+02 2.800e+00 2.690e+00 3.900e-01 1.820e+00 4.320e+00 1.040e+00 2.930e+00 7.350e+02]]

For the features that appeared to be the two most influential to us, we chose Alcohol and Flavonoids. Below are the respective histograms and the scatter plot.

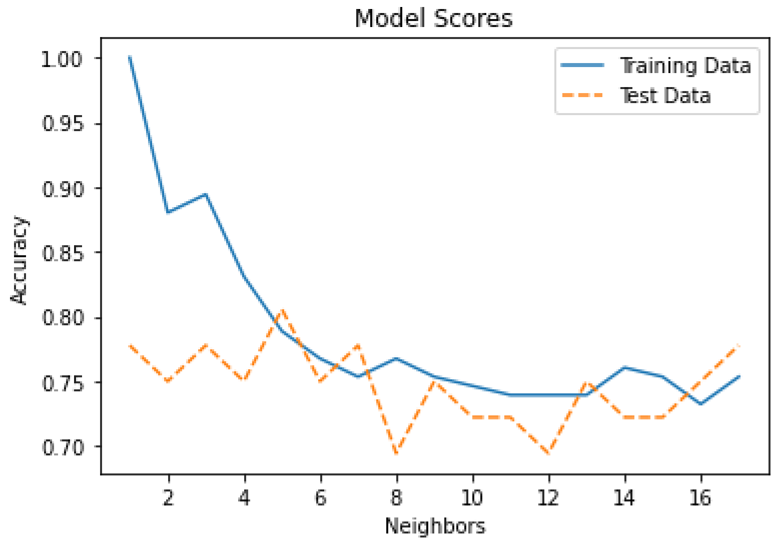






Section 4

We used the file *model_development.py* to train a KNN model using different numbers of neighbour counts to determine the optimal count of neighbors and the best accuracy.



Best KNN Score Was With 5 Neighbors and Score Was 0.8055555555555556

Section 5

We used the file *cross_validation.py* to generate the following table. The script uses stratified k-fold cross validation.

	Fold - 1	Fold - 2	Fold - 3	Fold - 4	Fold - 5	mean
Training Accuracy	0.795775	0.809859	0.816901	0.825175	0.762238	0.801990
Test Accuracy	0.666667	0.638889	0.611111	0.685714	0.714286	0.663333

Is the training and test accuracy in Step 4 validated using cross validation? Why or why not?

File Manifest

cross_validation.py
This is the file used to perform k-fold cross validation.

csvreader.py
This is the file we use to read the CSVs and use the data for the algorithms.

meet_the_data.py
This is the section where we do some pre-analysis on the data before we use it.

model_development.py
This is where we develop our initial KNN model.

report.docx
Microsoft Word copy of the report.

report.pdf
PDF copy of the report.

wine.data
The dataset used. Modified for feature names.

wine.names
The description of the dataset used.