A1Q2

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1 CMPT 423/820

1.1 Assignment 2 Question 2

- Seyedeh Mina Mousavifar
- 11279515
- sem311

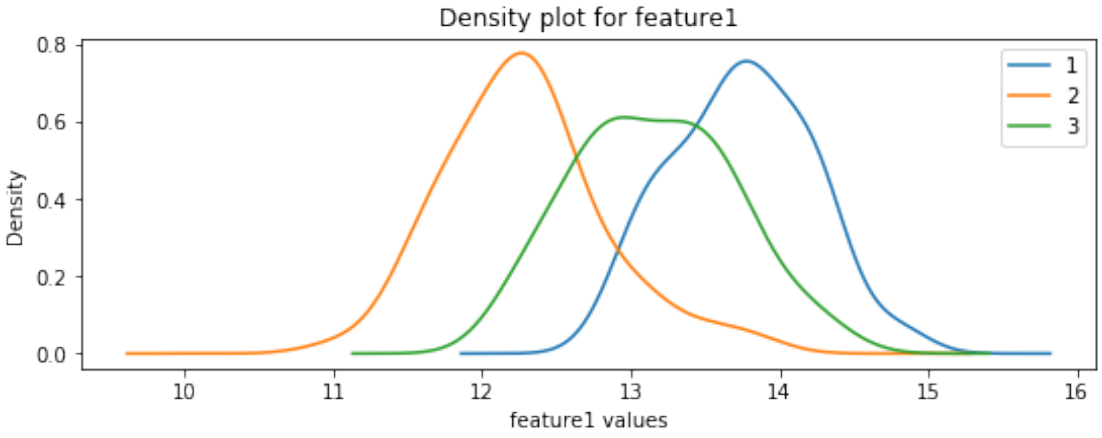

```
In [5]: import pandas as pd

        # creating header for the dataset
        header = list()
        for i in range(14):
            if i == 0:
                header.append('label')
                continue
            string = 'feature' + str(i)
            header.append(string)


        # reading dataset and adding header
        data = pd.read_csv('data/a2q3.csv',
                           header=None,
                           names=header)
```

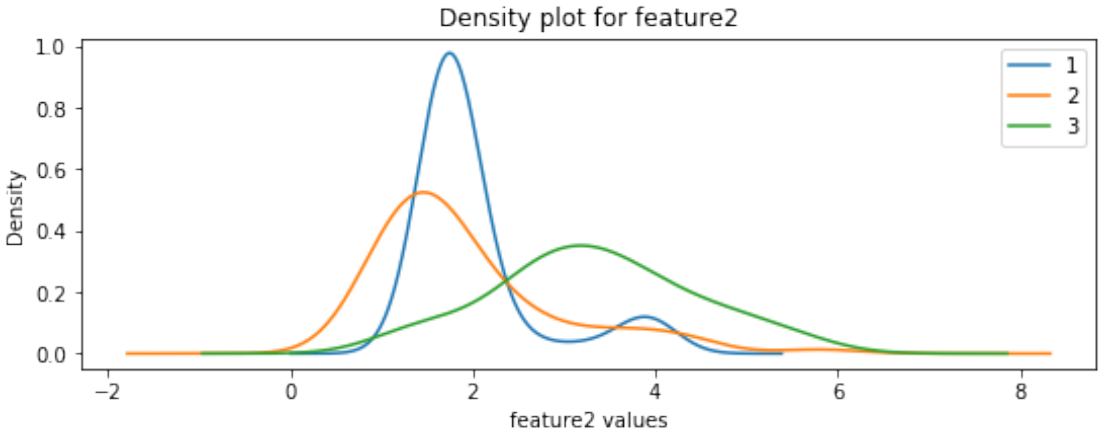
1.1.1 Part 1.

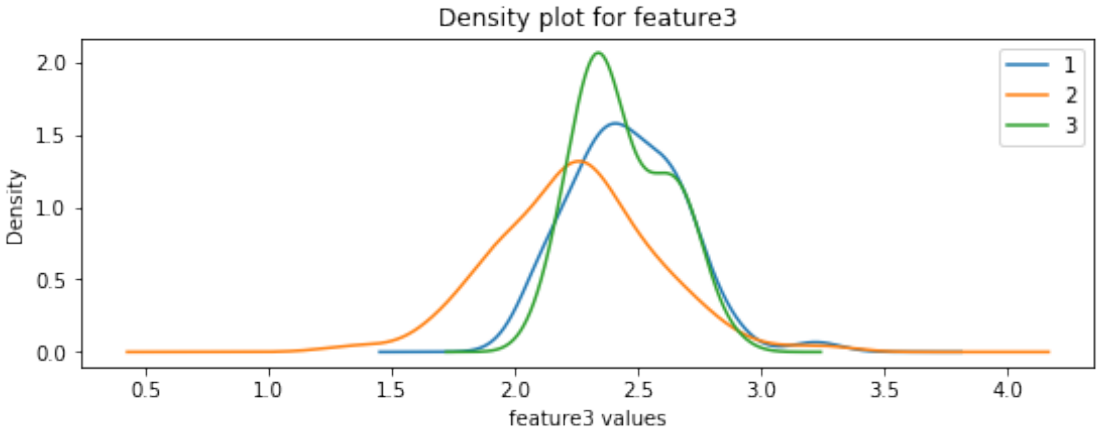
Plot the class densities for all 13 features, similar to A1Q7 Task 4.

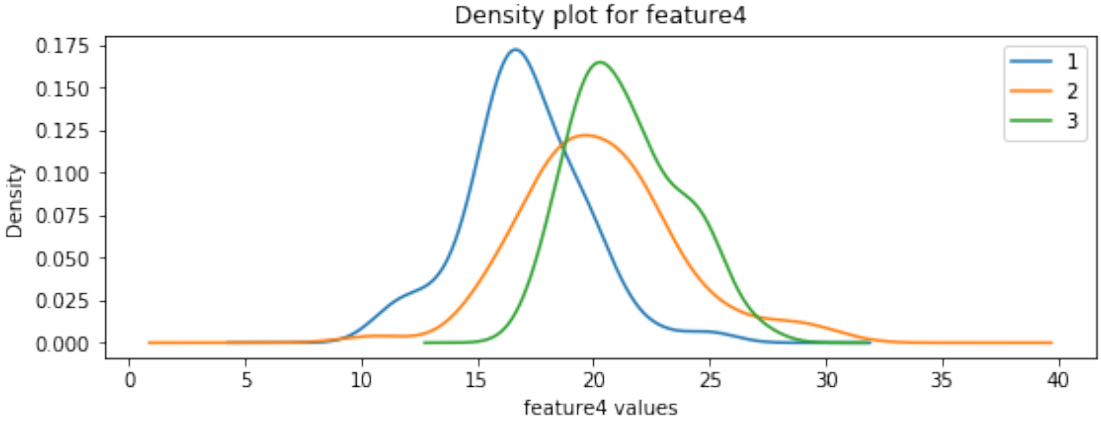
```
In [13]: import matplotlib.pyplot as plt

         for i in range(1, 14):

             # select only feature_i and label columns
             string = 'feature' + str(i)
             split = data.filter(items=[string, 'label'])

             # creating plot
```

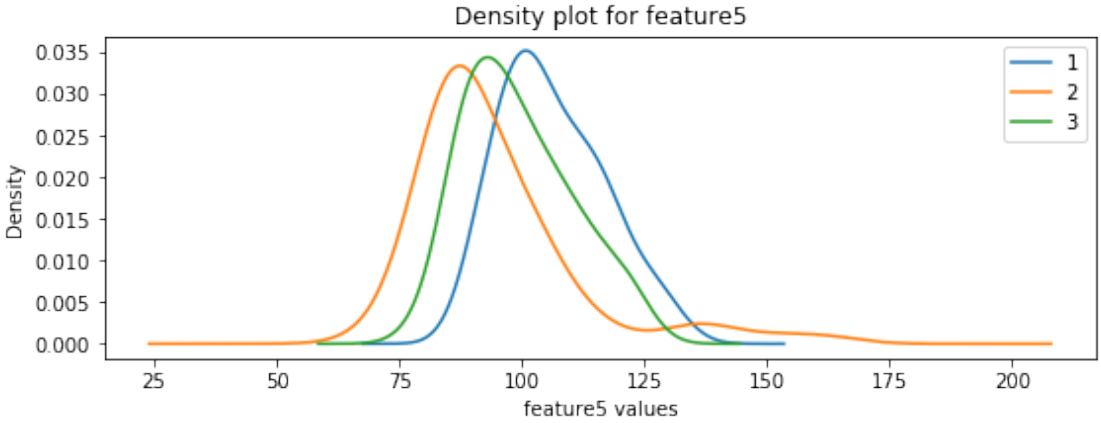
```
    fig, ax = plt.subplots(figsize=(9, 3))

    for label, df in split.groupby('label'):
        tmp_df = df[string]
        tmp_df.plot(kind="kde", ax=ax, label=label)

    plt.title('Density plot for ' + string)
    plt.xlabel(string + ' values')
    plot = plt.legend()

plt.show()
```

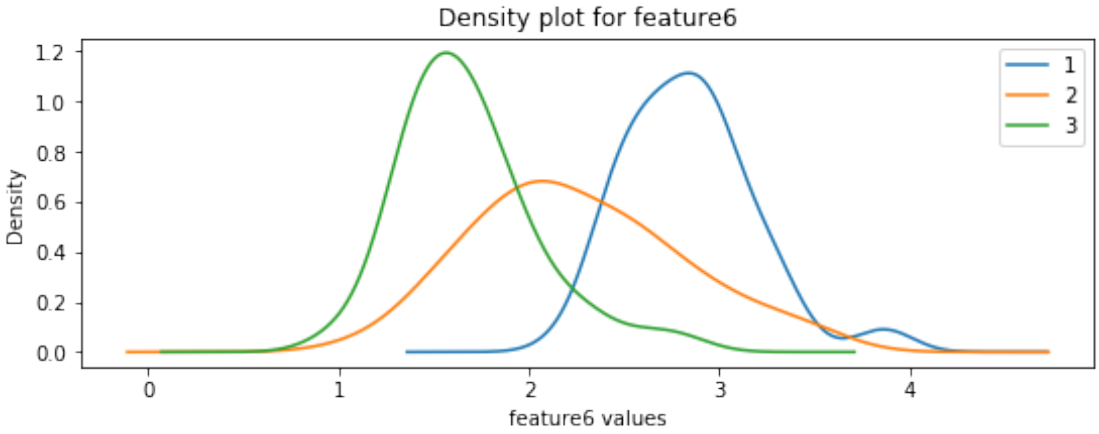


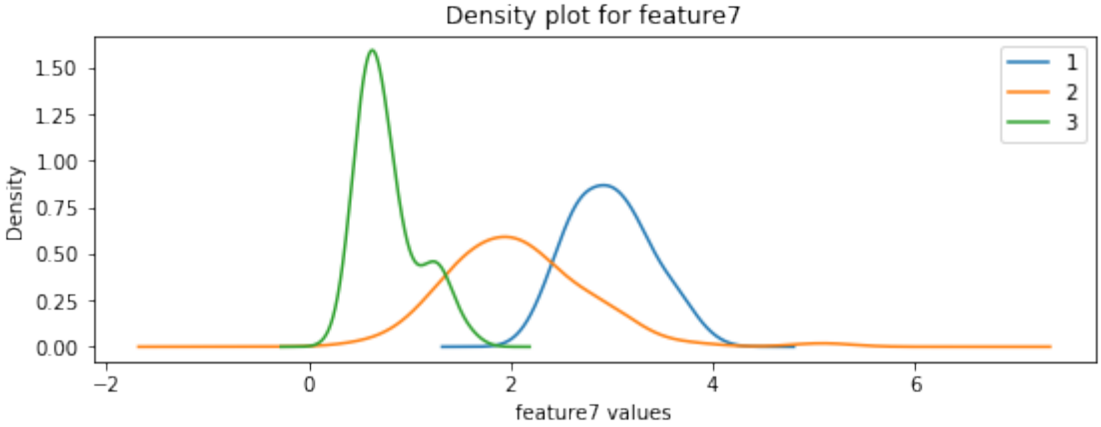


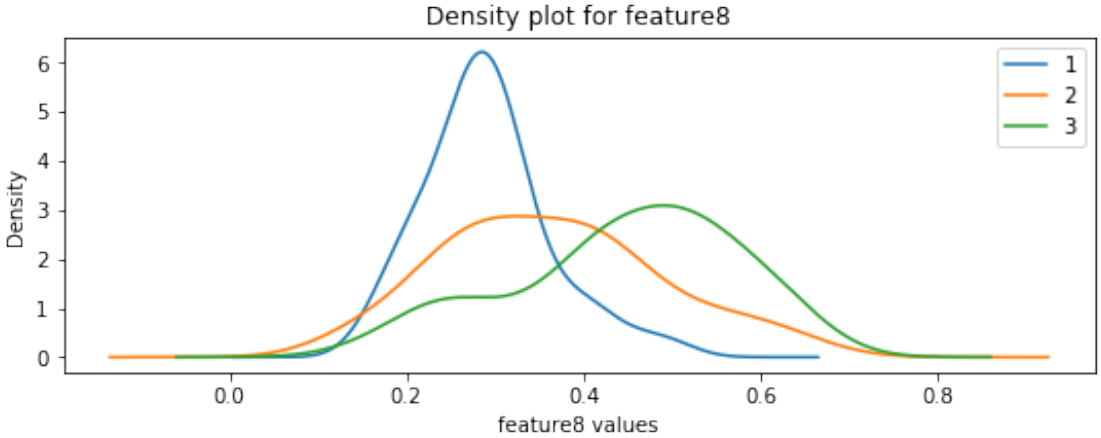

Density plot for feature3
Density
feature3 values
1
2
3

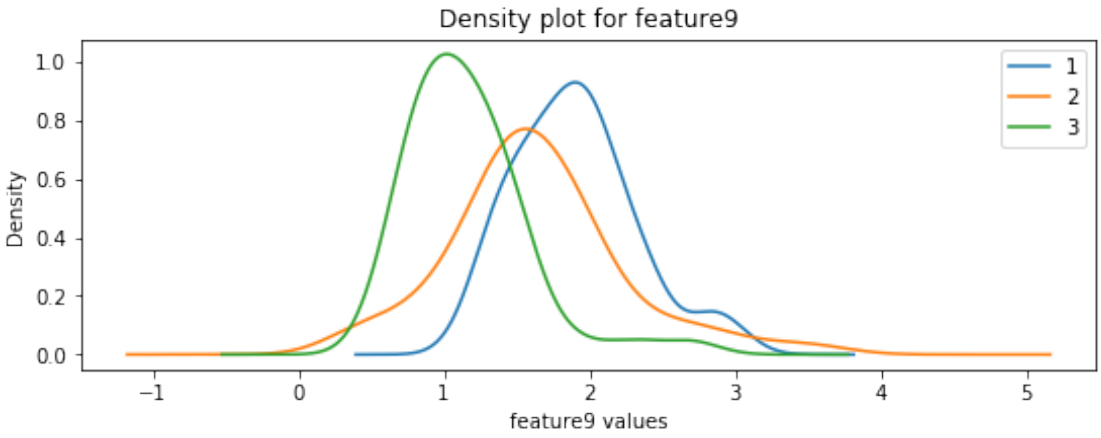

Density plot for feature4
Density
feature4 values
1
2
3

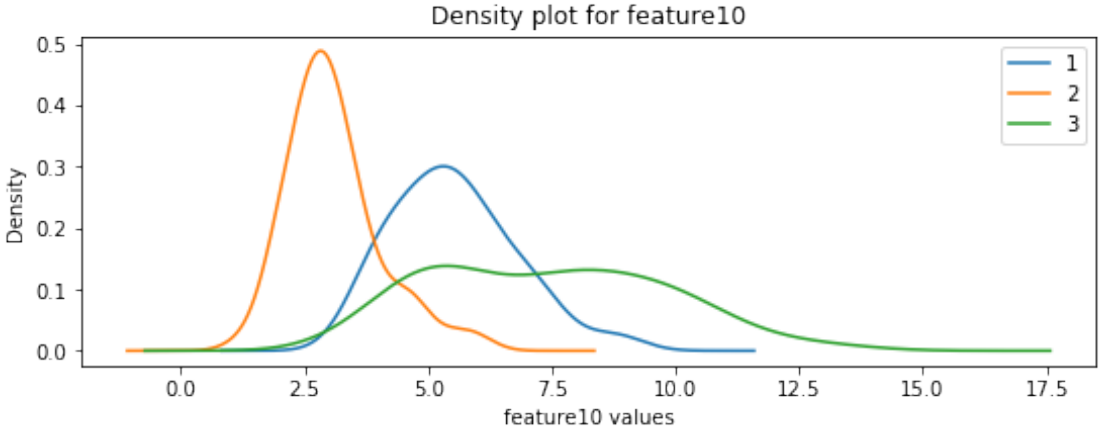

Density plot for feature5
Density
feature5 values
1
2
3

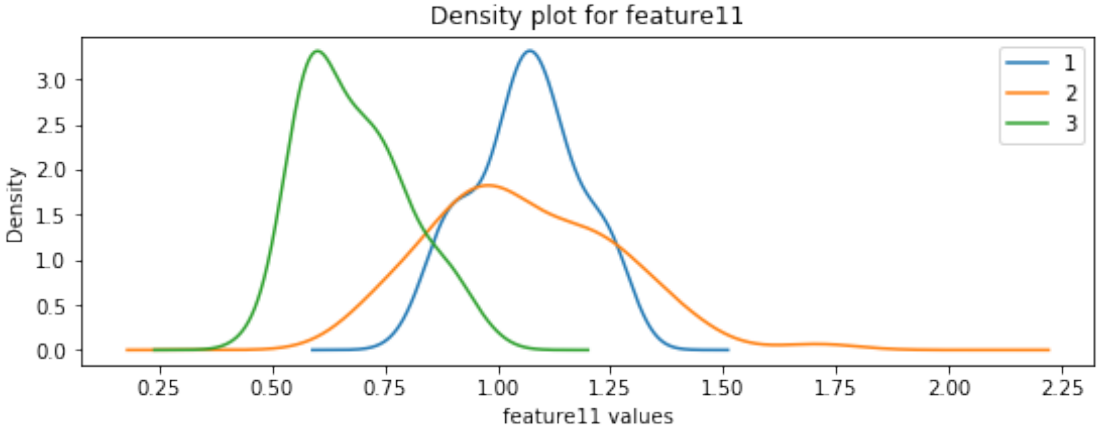

Density plot for feature6
Density
feature6 values
1
2
3

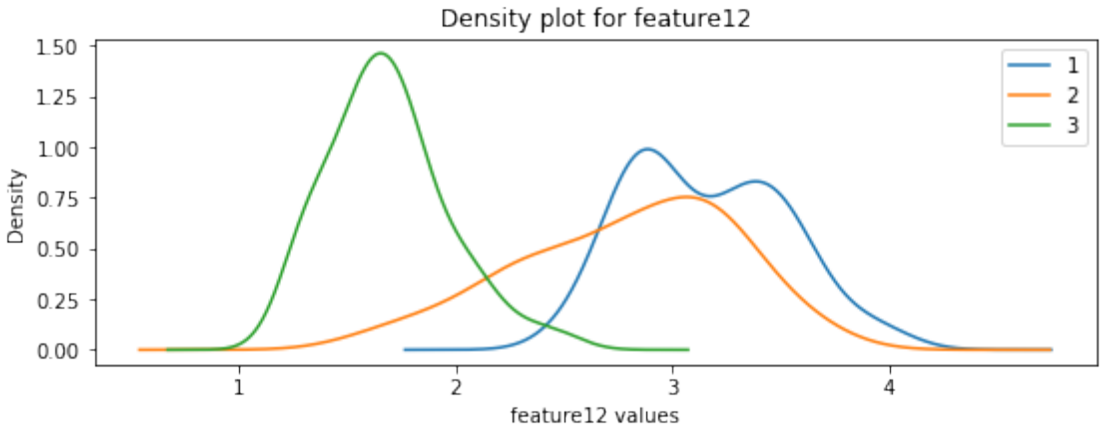

Density plot for feature7
Density
feature7 values
1
2
3

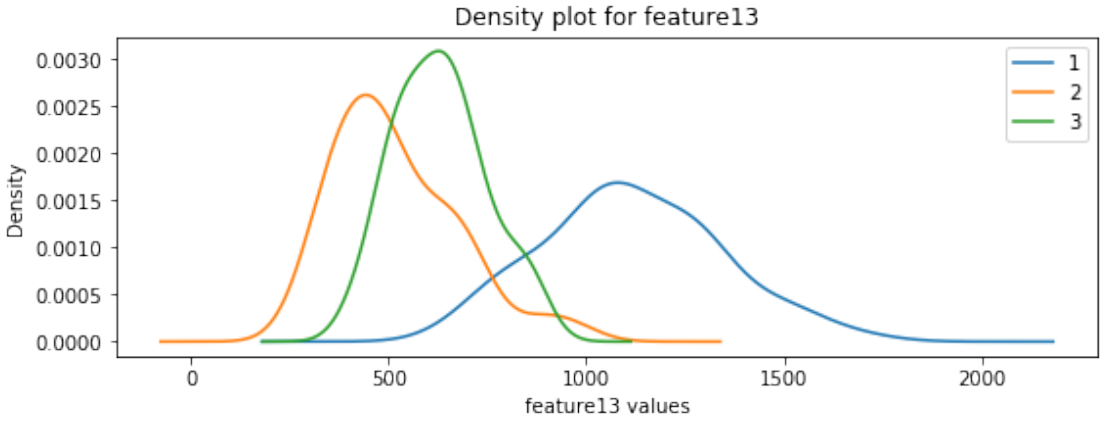

Density plot for feature8
Density
feature8 values
1
2
3


Density plot for feature9
Density
feature9 values
1
2
3


Density plot for feature10
Density
feature10 values
1
2
3


Density plot for feature11
Density
feature11 values
1
2
3





We compare the plots above, based on the curves overlap.

- *feature 1*: This feature might be right for discriminating label 2 from other labels, but might have problems to identify label 1 and 3 due to their overlap.
- *feature 2*: This feature might be right for discriminating label 3 from other labels, but might have problems to identify label 1 and 2 because most of their data interfere with each other.
- *feature 3*: This might be one of the least separating features because all curves profoundly interfere with each other.
- *feature 4*: This feature might be right for discriminating label 1 from other labels, but might have problems to identify label 2 and 3 due to their overlap.
- *feature 5*: This feature has more classification power compared to feature 3, but compared to features seen above, it might struggle more in specifying groups because of the overlay.
- *feature 6*: This feature is the second-best distinguishing feature because it can determine group 1 from group 3, however group 2 overlap with each group notably.
- *feature 7*: In my opinion, this is the best feature for classification, because the curves have the least overlap with each other.

- *feature 8*: This might be one of the least separating features because all curves highly interfere with each other.
- *feature 9*: This feature can specify group 1 from group 3, however, group 2 overlap with each group notably.
- *feature 10*: This feature might be right for discriminating label 2 from other labels, but might have problems to identify label 1 and 3 because most of their data interfere with each other.
- *feature 11*: This feature might be right for discriminating label 3 from other labels, but might have problems to identify label 1 and 2 due to their overlap.
- *feature 12*: This feature might be right for discriminating label 3 from other labels, but might have problems to identify label 1 and 2 because most of their data interfere with each other.
- *feature 13*: This feature is the third-best discriminating feature, because it has high potential to classify label 1 correctly, and has one the least overlaps between label 2 and 3.

Which, if any, of the 13 features, would you pick as the single feature in a 1-feature classifier?

> I would pick feature 7 as a single feature because its curves have the least interference with each other, so classification and recognizing groups differences would be easier.

Prior to building a classifier, do you think a classifier based on this data will have high accuracy?

> If we use all of the features together, we might not get a good result, because the order of the curves aren't consistent and they highly overlap with each other. However, I think that by pruning misleading and conflicting features, we might get an acceptable result. Especially because feature 7 can highly discriminate the groups.