Machine Learning Assignment 4

Nishit Reddy Lingala(700747128)

Video Link : https://drive.google.com/file/d/1jNr8QOdwI0w8An4HIYtqprcw-cmmkLo9/view?usp=share_link

Github Link: https://github.com/Nishitreddy/machine_learning.git

In [107]:
```
import warnings
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn import preprocessing
import matplotlib.pyplot as plt
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score, recall_score, precision_score, classification_report, confusion_matrix
warnings.filterwarnings("ignore")
```

In [108]:
```
#1. Read the provided CSV file 'data.csv'. https://drive.google.com/drive/folders/1h8C3mLsso-R-sIOLsvoYwPLzy2fJ4IOF?usp
df = pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/data.csv")
print(df.head())
```

```
   Duration  Pulse  Maxpulse  Calories
0        60    110       130     409.1
1        60    117       145     479.0
2        60    103       135     340.0
3        45    109       175     282.4
4        45    117       148     406.0
```

In [109]:
```
#2. Show the basic statistical description about the data.
print(df.describe())
```

```
         Duration       Pulse    Maxpulse     Calories
count  169.000000  169.000000  169.000000   164.000000
mean    63.846154  107.461538  134.047337   375.790244
std     42.299949   14.510259   16.450434   266.379919
min     15.000000   80.000000  100.000000    50.300000
25%     45.000000  100.000000  124.000000   250.925000
50%     60.000000  105.000000  131.000000   318.600000
75%     60.000000  111.000000  141.000000   387.600000
max    300.000000  159.000000  184.000000  1860.400000
```

In [110]:
```
df.isnull().any()
```

In [110]:
```
df.isnull().any()
```

Out[110]:
```
Duration    False
Pulse       False
Maxpulse    False
Calories     True
dtype: bool
```

In [111]:
```
#Replace the null values with the mean
df.fillna(df.mean(), inplace=True)
df.isnull().any()
```

Out[111]:
```
Duration    False
Pulse       False
Maxpulse    False
Calories    False
dtype: bool
```

In [112]:
```
df.agg({'Duration':['min','max','count','mean'],'Pulse':['min','max','count','mean']})
```

Out[112]:

	Duration	Pulse
min	15.000000	80.000000
max	300.000000	159.000000
count	169.000000	169.000000
mean	63.846154	107.461538

In [113]:
```
df.loc[(df['Calories']>500)&(df['Calories']<1000)]
```

Out[113]:

	Duration	Pulse	Maxpulse	Calories
51	80	123	146	643.1
62	160	109	135	853.0
65	180	90	130	800.4
66	150	105	135	873.4

```
In [113]: df.loc[(df['Calories']>500)&(df['Calories']<1000)]
```

Out[113]:

	Duration	Pulse	Maxpulse	Calories
51	80	123	146	643.1
62	160	109	135	853.0
65	180	90	130	800.4
66	150	105	135	873.4
67	150	107	130	816.0
72	90	100	127	700.0
73	150	97	127	953.2
75	90	98	125	563.2
78	120	100	130	500.4
90	180	101	127	600.1
99	90	93	124	604.1
103	90	90	100	500.4
106	180	90	120	800.3
108	90	90	120	500.3

```
In [114]: #6. Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
df.loc[(df['Calories']>500)&(df['Pulse']<100)]
```

Out[114]:

	Duration	Pulse	Maxpulse	Calories
65	180	90	130	800.4
70	150	97	129	1115.0
73	150	97	127	953.2
75	90	98	125	563.2
99	90	93	124	604.1
103	90	90	100	500.4


```
In [114]: #6. Filter the dataframe to select the rows with calories values > 500 and pulse < 100.
df.loc[(df['Calories']>500)&(df['Pulse']<100)]
```

Out[114]:

	Duration	Pulse	Maxpulse	Calories
65	180	90	130	800.4
70	150	97	129	1115.0
73	150	97	127	953.2
75	90	98	125	563.2
99	90	93	124	604.1
103	90	90	100	500.4
106	180	90	120	800.3
108	90	90	120	500.3


```
In [115]: #7. Create a new "df_modified" dataframe that contains all the columns from df except for "Maxpulse".
df_modified = df[['Duration','Pulse','Calories']]
df_modified.head()
```

Out[115]:

	Duration	Pulse	Calories
0	60	110	409.1
1	60	117	479.0
2	60	103	340.0
3	45	109	282.4
4	45	117	406.0

```
In [116]: #8. Delete the "Maxpulse" column from the main df dataframe
del df['Maxpulse']
```

```
In [117]: df.head()
```

Out[117]:

	Duration	Pulse	Calories

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In [116]:
```
#8. Delete the "Maxpulse" column from the main df dataframe
del df['Maxpulse']
```

In [117]:
```
df.head()
```

Out[117]:

	Duration	Pulse	Calories
0	60	110	409.1
1	60	117	479.0
2	60	103	340.0
3	45	109	282.4
4	45	117	406.0

In [118]:
```
df.dtypes
```

Out[118]:
```
Duration      int64
Pulse         int64
Calories    float64
dtype: object
```

In [119]:
```
df['Calories'] = df['Calories'].astype(np.int64)
df.dtypes
```

Out[119]:
```
Duration    int64
Pulse       int64
Calories    int64
dtype: object
```

In [120]:
```
df.plot.scatter(x='Duration',y='Calories',c='blue')
```

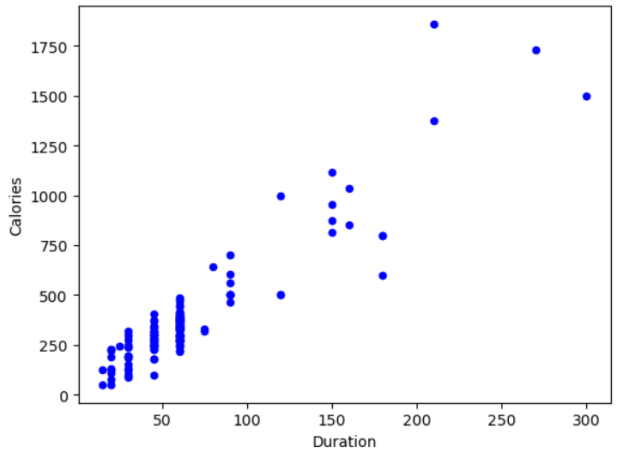
Out[120]:
```
<Axes: xlabel='Duration', ylabel='Calories'>
```

Search

Run Code

In [120]:
```
df.plot.scatter(x='Duration',y='Calories',c='blue')
```

Out[120]:
```
<Axes: xlabel='Duration', ylabel='Calories'>
```



In [121]:
```
# In[15]:


import warnings
import pandas as pd
import seaborn as sns
from sklearn import preprocessing
import matplotlib.pyplot as plt

get_ipython().run_line_magic('matplotlib', 'inline')
# Supresswarnings
```

Search

```
import warnings
import pandas as pd
import seaborn as sns
from sklearn import preprocessing
import matplotlib.pyplot as plt

get_ipython().run_line_magic('matplotlib', 'inline')
# Supresswarnings
warnings.filterwarnings("ignore")
```

In [122]:
```
df=pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/train.csv")
```

In [123]:
```
df.head()
```

Out[123]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [124]:
```
le = preprocessing.LabelEncoder()
df['Sex'] = le.fit_transform(df.Sex.values)
df['Survived'].corr(df['Sex'])
```

Out[124]:
```
-0.543351380657755
```

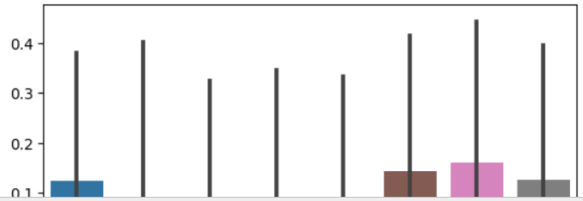
In [125]:
```
des=df.corr()
df.corr().style.background_gradient(cmap="pink")
```

Out[125]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.042939	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.543351	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	0.131900	-0.369226	0.083081	0.018443	-0.549500
Sex	0.042939	-0.543351	0.131900	1.000000	0.093254	-0.114631	-0.245489	-0.182333
Age	0.036847	-0.077221	-0.369226	0.093254	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.114631	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.245489	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	-0.182333	0.096067	0.159651	0.216225	1.000000

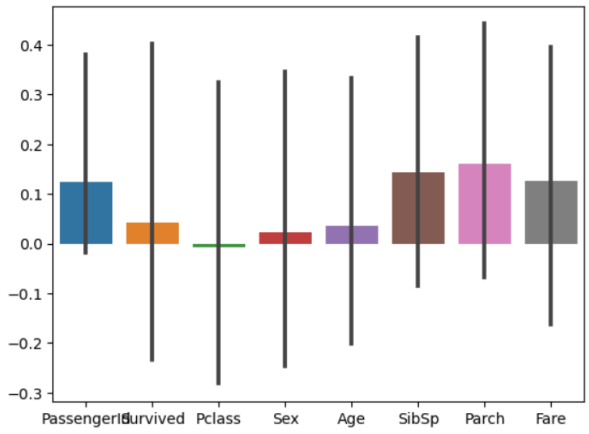
In [126]:
```
sns.barplot(data=des) #BarPlot Visualization for above dataset
```

Out[126]:
```
<Axes: >
```



In [126]:
```
sns.barplot(data=des) #BarPlot Visualization for above dataset
```

Out[126]: <Axes: >



In [127]:
```
train_raw = pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/train.csv")
test_raw = pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/test.csv")
# Join data to analyse and process the set as one.
train_raw['train'] = 1
test_raw['train'] = 0
df = train_raw.append(test_raw, sort=False)
features = ['Age', 'Embarked', 'Fare', 'Parch', 'Pclass', 'Sex', 'SibSp']
target = 'Survived'

df = df[features + [target] + ['train']]
# Categorical values need to be transformed into numeric.
df['Sex'] = df['Sex'].replace(["female", "male"], [0, 1])
```

```
classifier = GaussianNB()

classifier.fit(X_train, Y_train)
```

Out[131]:

GaussianNB

GaussianNB()

In [132]:
```
y_pred = classifier.predict(X_val)

# Summary of the predictions made by the classifier
print(classification_report(Y_val, y_pred))
print(confusion_matrix(Y_val, y_pred))
# Accuracy score
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(Y_val, y_pred))
```

```
              precision    recall  f1-score   support

         0.0       0.79      0.80      0.80        85
         1.0       0.70      0.69      0.70        58

    accuracy                           0.76       143
   macro avg       0.75      0.74      0.75       143
weighted avg       0.75      0.76      0.75       143

[[68 17]
 [18 40]]
accuracy is 0.7552447552447552
```

In [133]:
```
glass=pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/glass.csv")
```

In [134]:
```
glass.head()
```

Out[134]:

	RI	Na	Mg	Al	Si	K	Ca	Ba	Fe	Type
0	1.52101	13.64	4.49	1.10	71.78	0.06	8.75	0.0	0.0	1
1	1.51761	13.89	3.60	1.36	72.73	0.48	7.83	0.0	0.0	1
2	1.51618	13.53	3.55	1.54	72.99	0.39	7.78	0.0	0.0	1

In [133]:
```
glass=pd.read_csv("/Users/snush/OneDrive/Desktop/dataset/glass.csv")
```

In [134]:
```
glass.head()
```

Out[134]:

	RI	Na	Mg	Al	Si	K	Ca	Ba	Fe	Type
0	1.52101	13.64	4.49	1.10	71.78	0.06	8.75	0.0	0.0	1
1	1.51761	13.89	3.60	1.36	72.73	0.48	7.83	0.0	0.0	1
2	1.51618	13.53	3.55	1.54	72.99	0.39	7.78	0.0	0.0	1
3	1.51766	13.21	3.69	1.29	72.61	0.57	8.22	0.0	0.0	1
4	1.51742	13.27	3.62	1.24	73.08	0.55	8.07	0.0	0.0	1

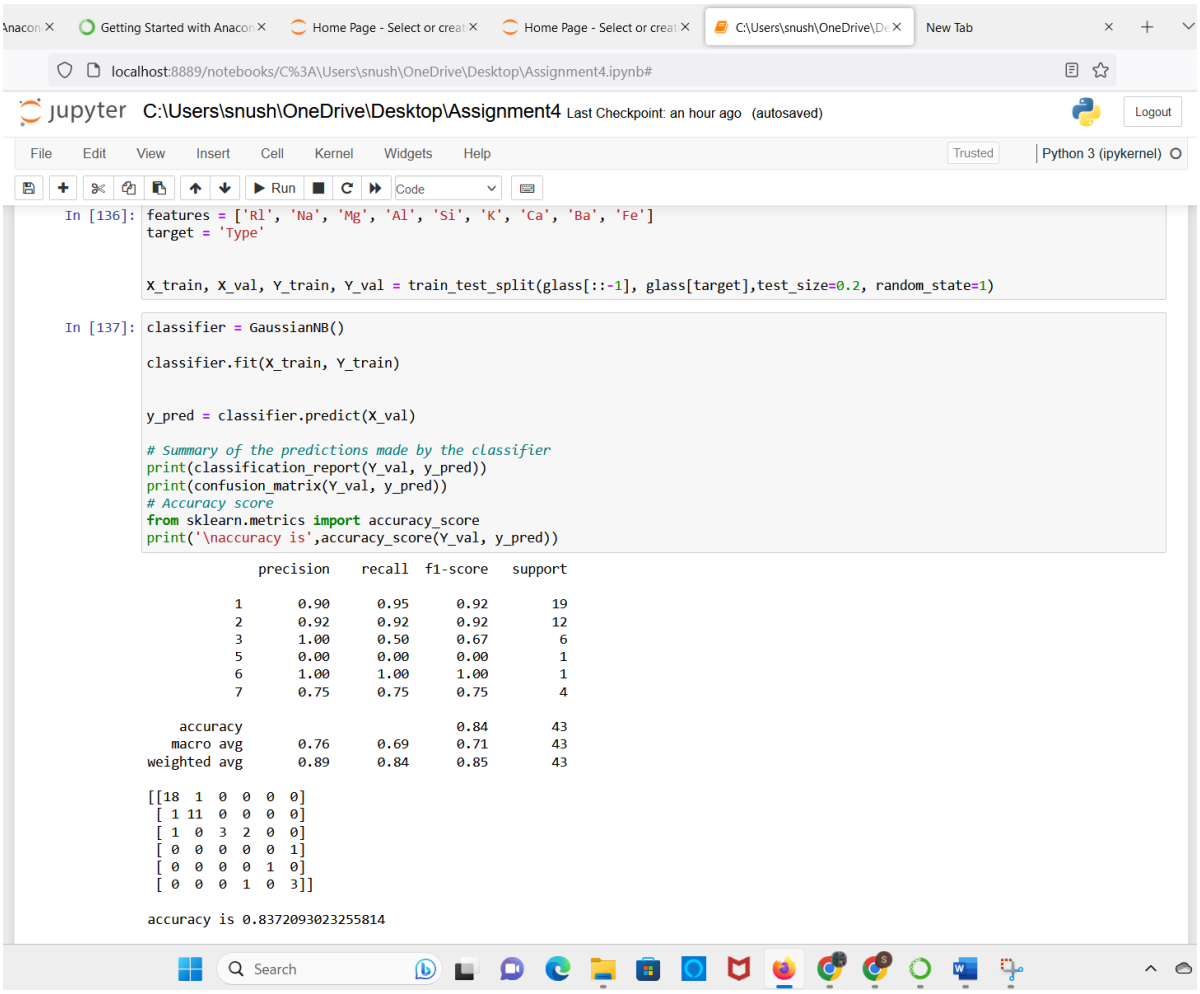
In [135]:
```
des=glass.corr()
glass.corr().style.background_gradient(cmap="pink")
```

Out[135]:

	RI	Na	Mg	Al	Si	K	Ca	Ba	Fe	Type
RI	1.000000	-0.191885	-0.122274	-0.407326	-0.542052	-0.289833	0.810403	-0.000386	0.143010	-0.164237
Na	-0.191885	1.000000	-0.273732	0.156794	-0.069809	-0.266087	-0.275442	0.326603	-0.241346	0.502898
Mg	-0.122274	-0.273732	1.000000	-0.481799	-0.165927	0.005396	-0.443750	-0.492262	0.083060	-0.744993
Al	-0.407326	0.156794	-0.481799	1.000000	-0.005524	0.325958	-0.259592	0.479404	-0.074402	0.598829
Si	-0.542052	-0.069809	-0.165927	-0.005524	1.000000	-0.193331	-0.208732	-0.102151	-0.094201	0.151565
K	-0.289833	-0.266087	0.005396	0.325958	-0.193331	1.000000	-0.317836	-0.042618	-0.007719	-0.010054
Ca	0.810403	-0.275442	-0.443750	-0.259592	-0.208732	-0.317836	1.000000	-0.112841	0.124968	0.000952
Ba	-0.000386	0.326603	-0.492262	0.479404	-0.102151	-0.042618	-0.112841	1.000000	-0.058692	0.575161
Fe	0.143010	-0.241346	0.083060	-0.074402	-0.094201	-0.007719	0.124968	-0.058692	1.000000	-0.188278
Type	-0.164237	0.502898	-0.744993	0.598829	0.151565	-0.010054	0.000952	0.575161	-0.188278	1.000000

In [136]:
```
features = ['Rl', 'Na', 'Mg', 'Al', 'Si', 'K', 'Ca', 'Ba', 'Fe']
target = 'Type'


X_train, X_val, Y_train, Y_val = train_test_split(glass[::-1], glass[target],test_size=0.2, random_state=1)
```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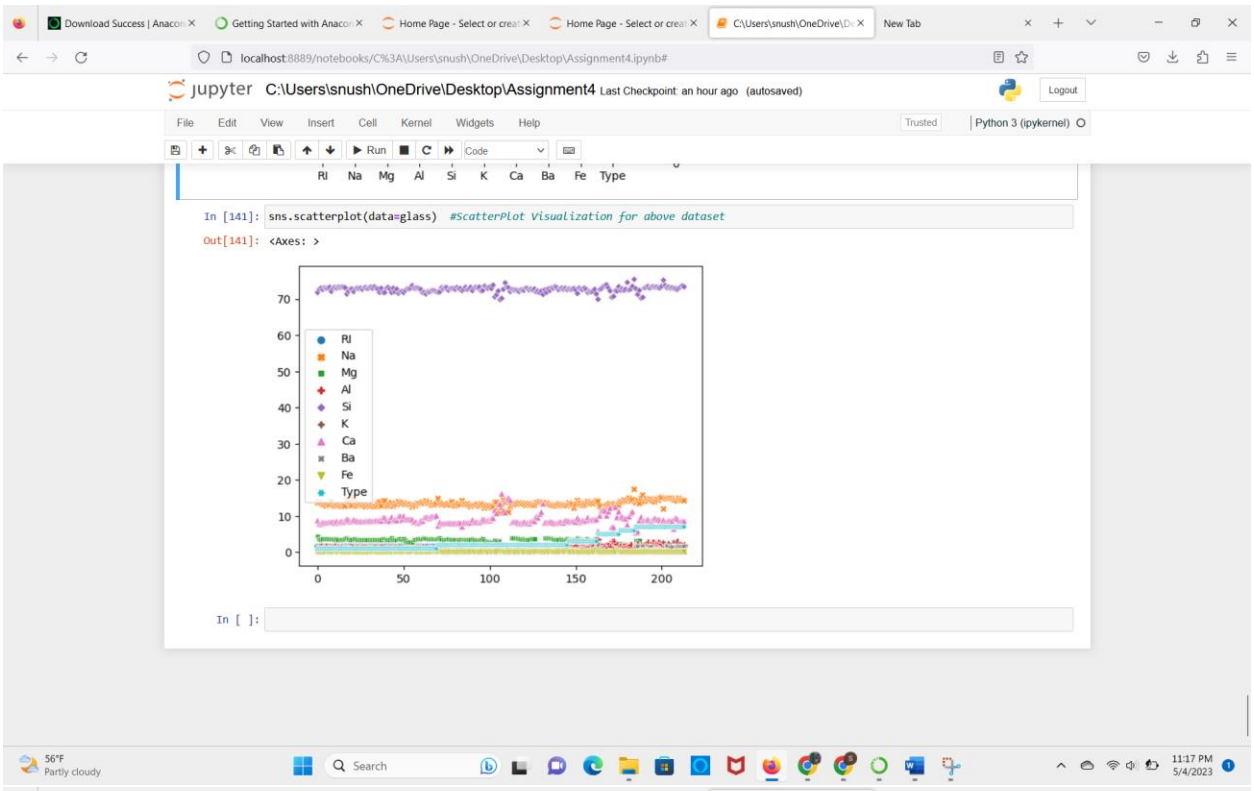
Python 3 (ipykernel)
Run
Code
In [136]:
features = ['Rl', 'Na', 'Mg', 'Al', 'Si', 'K', 'Ca', 'Ba', 'Fe']
target = 'Type'
X_train, X_val, Y_train, Y_val = train_test_split(glass[::-1], glass[target],test_size=0.2, random_state=1)
In [137]:
classifier = GaussianNB()
classifier.fit(X_train, Y_train)
y_pred = classifier.predict(X_val)
# Summary of the predictions made by the classifier
print(classification_report(Y_val, y_pred))
print(confusion_matrix(Y_val, y_pred))
# Accuracy score
from sklearn.metrics import accuracy_score
print('\naccuracy is',accuracy_score(Y_val, y_pred))
precision recall f1-score support
1 0.90 0.95 0.92 19
2 0.92 0.92 0.92 12
3 1.00 0.50 0.67 6
5 0.00 0.00 0.00 1
6 1.00 1.00 1.00 1
7 0.75 0.75 0.75 4
accuracy 0.84 43
macro avg 0.76 0.69 0.71 43
weighted avg 0.89 0.84 0.85 43
[[18 1 0 0 0 0]
[1 11 0 0 0 0]
[1 0 3 2 0 0]
[0 0 0 0 0 1]
[0 0 0 0 1 0]
[0 0 0 1 0 3]]
accuracy is 0.8372093023255814
Search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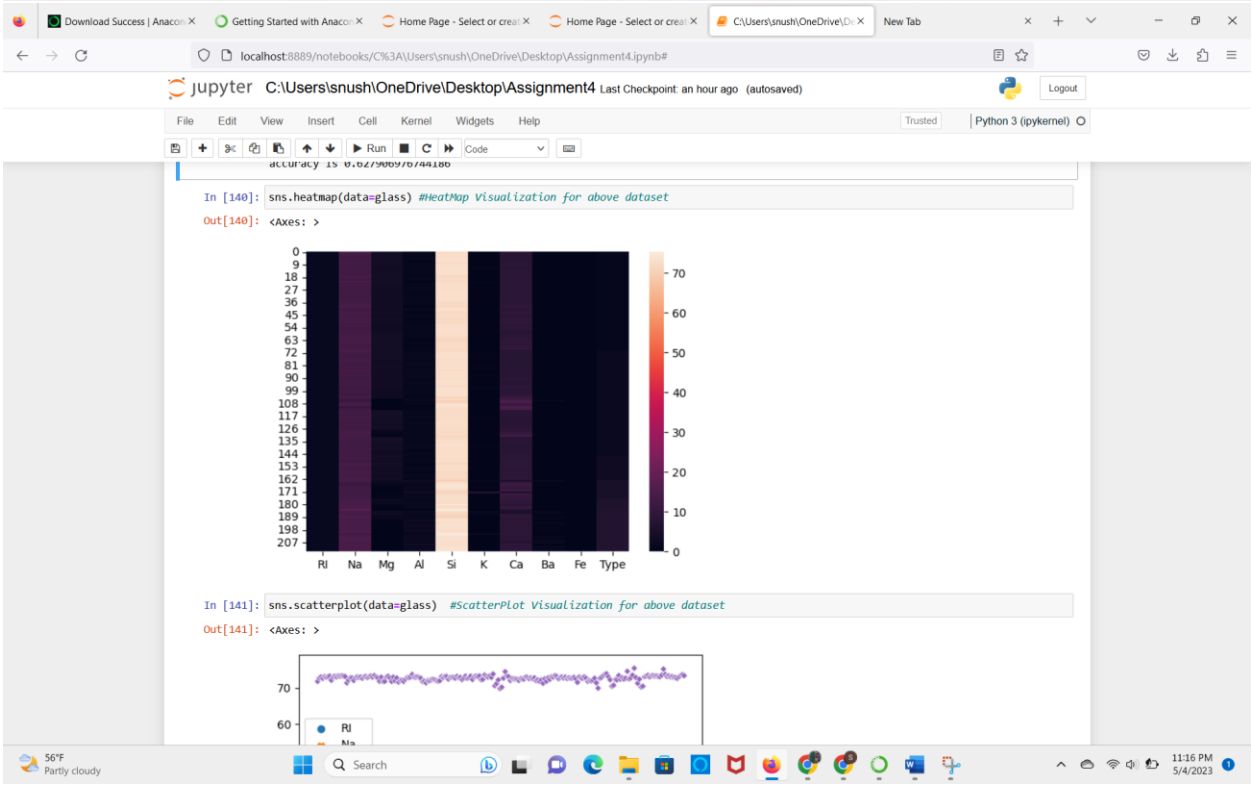
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
RI Na Mg Al Si K Ca Ba Fe Type
In [141]: sns.scatterplot(data=glass) #ScatterPlot Visualization for above dataset
Out[141]: <Axes: >
RI
Na
Mg
Al
Si
K
Ca
Ba
Fe
Type
In [ ]:
56°F
Partly cloudy
Search
11:17 PM
5/4/2023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jupyter C:\Users\snush\OneDrive\Desktop\Assignment4 Last Checkpoint: an hour ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
In [140]: sns.heatmap(data=glass) #HeatMap Visualization for above dataset
Out[140]: <Axes: >
RI Na Mg Al Si K Ca Ba Fe Type
In [141]: sns.scatterplot(data=glass) #ScatterPlot Visualization for above dataset
Out[141]: <Axes: >
RI
56°F
Partly cloudy
Search
11:16 PM
5/4/2023