Mohmad Hosein Ashoori - 97149068

HW3

In [ ]:
```
import pandas as pd
from sklearn import preprocessing, decomposition
import scipy.stats as stats
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
% matplotlib inline
matplotlib.style.use('fivethirtyeight')
```

```
UsageError: Line magic function `%` not found.
```

In [ ]:
```
plt.style.use("dark_background")
for pdram in ['text.color', 'axes.labelcolor', 'xtick.color', 'ytick.color']:
    plt.rcParams[pdram] = '0.9'  # very light grey
for pdram in ['figure.facecolor', 'axes.facecolor', 'savefig.facecolor']:
    plt.rcParams[pdram] = '#181c23'  # bluish dark grey
```

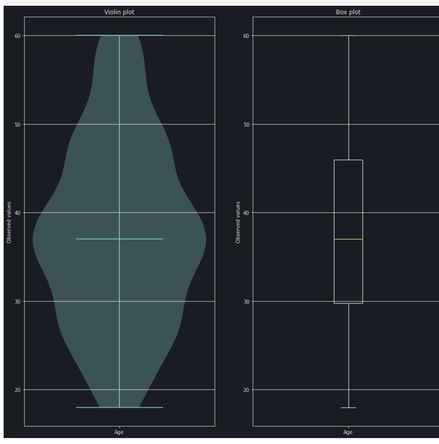
1

In [ ]:
```
social_network_ads = pd.read_csv('file/Social_Network_Ads.csv')
social_network_ads.head(10)
```

Out[ ]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
5	15728773	Male	27	58000	0
6	15598044	Female	27	84000	0
7	15694829	Female	32	150000	1
8	15600575	Male	25	33000	0
9	15727311	Female	35	65000	0

In [ ]:
```
fig, axs = plt.subplots(nrows=1, ncols=2, figsize=(15, 15))

# Fixing random state for reproducibility
np.random.seed(19680801)


# generate some random test data
# all_data = [np.random.normal(0, std, 100) for std in range(6, 10)]
all_data = social_network_ads[["Age"]]

# plot violin plot
axs[0].violinplot(all_data,
                  showmeans=False,
                  showmedians=True)
axs[0].set_title('Violin plot')

# plot box plot
axs[1].boxplot(all_data)
axs[1].set_title('Box plot')

# adding horizontal grid lines
for ax in axs:
    ax.yaxis.grid(True)
    ax.set_xticks([y + 1 for y in range(set(all_data).__len__())],
                  labels=list(set(all_data)))
    # ax.set_xlabel('Four separate samples')
    ax.set_ylabel('Observed values')

plt.show()
```



Question 2

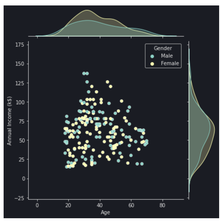
In [ ]:
```
mall_customers = pd.read_csv('file/Mall_Customers.csv')
mall_customers.head(10)
```

Out[ ]:

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40
5	6	Female	22	17	76
6	7	Female	35	18	6
7	8	Female	23	18	94
8	9	Male	64	19	3
9	10	Female	30	19	72

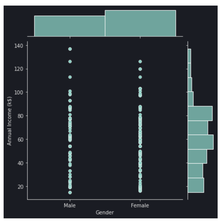
In [ ]:
```
sns.jointplot(data=mall_customers, x="Age", y="Annual Income (k$)",hue='Gender')
```

Out[ ]:
```
<seaborn.axisgrid.JointGrid at 0x2aef06e86d0>
```



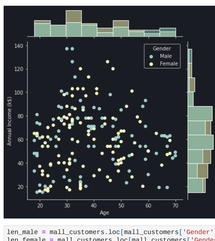
In [ ]:
```
sns.jointplot(data=mall_customers, x="Gender", y="Annual Income (k$)")
```

Out[ ]:
```
<seaborn.axisgrid.JointGrid at 0x2aef1ca2310>
```



In [ ]:
```
g = sns.JointGrid(data=mall_customers, x="Age", y="Annual Income (k$)",hue='Gender')
g.plot(sns.scatterplot, sns.histplot)
```

Out[ ]:
```
<seaborn.axisgrid.JointGrid at 0x2aef345ee80>
```



In [ ]:
```
len_male = mall_customers.loc[mall_customers['Gender']=='Male']
len_female = mall_customers.loc[mall_customers['Gender']=='Female']
print(f'Female: {len(len_female)}\nMale: {len(len_male)}')
```

```
Female: 112
Male: 88
```

In [ ]:
```
dataset = [['Milk', 'Onion', 'Nutmeg', 'Kidney Beans', 'Eggs', 'Yogurt'],
 ['Dill', 'Onion', 'Nutmeg', 'Kidney Beans', 'Eggs', 'Yogurt'],
 ['Milk', 'Apple', 'Kidney Beans', 'Eggs'],
 ['Milk', 'Unicorn', 'Corn', 'Kidney Beans', 'Yogurt'],
 ['Corn', 'Onion', 'Onion', 'Kidney Beans', 'Ice cream', 'Eggs']]
```

In [ ]:
```
from apriori_python import apriori
itemSetList = dataset
freqItemSet, rules = apriori(itemSetList, minSup=0.6, minConf=0.7)
print(freqItemSet)
rules
# [{'beer'}, {'rice'}, 0.6666666666666666], [{'rice'}, {'beer'}, 1.0]]
# rules[0] --> rules[1], confidence = rules[2]
```

```
{1: {frozenset({'Yogurt'}), frozenset({'Eggs'}), frozenset({'Kidney Beans'}), frozenset({'Milk'}), frozenset({'Onion'})}, 2: {frozenset({'Onion', 'Eggs'}), frozenset({'Eggs', 'Kidney Beans'}), frozenset({'Yogurt', 'Kidney Beans'}), frozenset({'Milk', 'Kidney Beans'}), frozenset({'Onion', 'Kidney Beans'})}, 3: {frozenset({'Onion', 'Eggs', 'Kidney Beans'})}}
[{('Eggs',), ('Onion',), 0.75},
 {('Eggs',), ('Kidney Beans', 'Onion'), 0.75},
 {('Eggs', 'Kidney Beans'), ('Onion',), 0.75},
 {('Kidney Beans',), ('Eggs',), 0.8},
 {('Onion',), ('Eggs',), 1.0},
 {('Eggs',), ('Kidney Beans',), 1.0},
 {('Yogurt',), ('Kidney Beans',), 1.0},
 {('Milk',), ('Kidney Beans',), 1.0},
 {('Onion',), ('Kidney Beans',), 1.0},
 {('Onion',), ('Eggs', 'Kidney Beans'), 1.0},
 {('Eggs', 'Onion'), ('Kidney Beans',), 1.0},
 {('Kidney Beans', 'Onion'), ('Eggs',), 1.0}]
```