Lab-5

Correlation Analysis

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Import Libraries

In [20]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import scipy
from scipy.stats.stats import pearsonr
from scipy.stats.stats import spearmanr
import warnings
import numpy as np
warnings.filterwarnings('ignore')
```

Import Titanic dataset

In [4]:
```
df = pd.read_csv('titanic.csv')
```

Read head of the dataset

In [5]:
```
df.head()
```

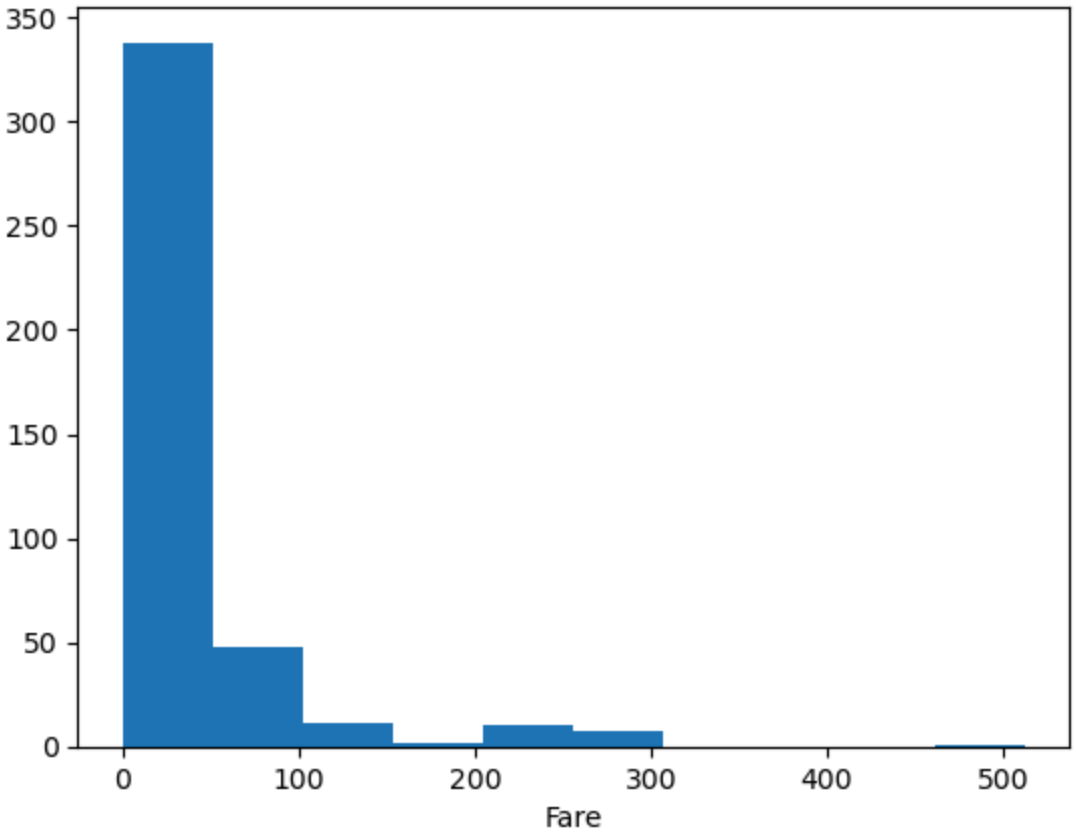
Out[5]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Em
0	892	3	Kelly, Mr. James	male	34.5	0	0	330911	7.8292	NaN	
1	893	3	Wilkes, Mrs. James (Ellen Needs)	female	47.0	1	0	363272	7.0000	NaN	
2	894	2	Myles, Mr. Thomas Francis	male	62.0	0	0	240276	9.6875	NaN	
3	895	3	Wirz, Mr. Albert	male	27.0	0	0	315154	8.6625	NaN	
4	896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)	female	22.0	1	1	3101298	12.2875	NaN	

Exercise 1

In [6]:
```
plt.hist(df['Fare'])
plt.xlabel('Fare')
```

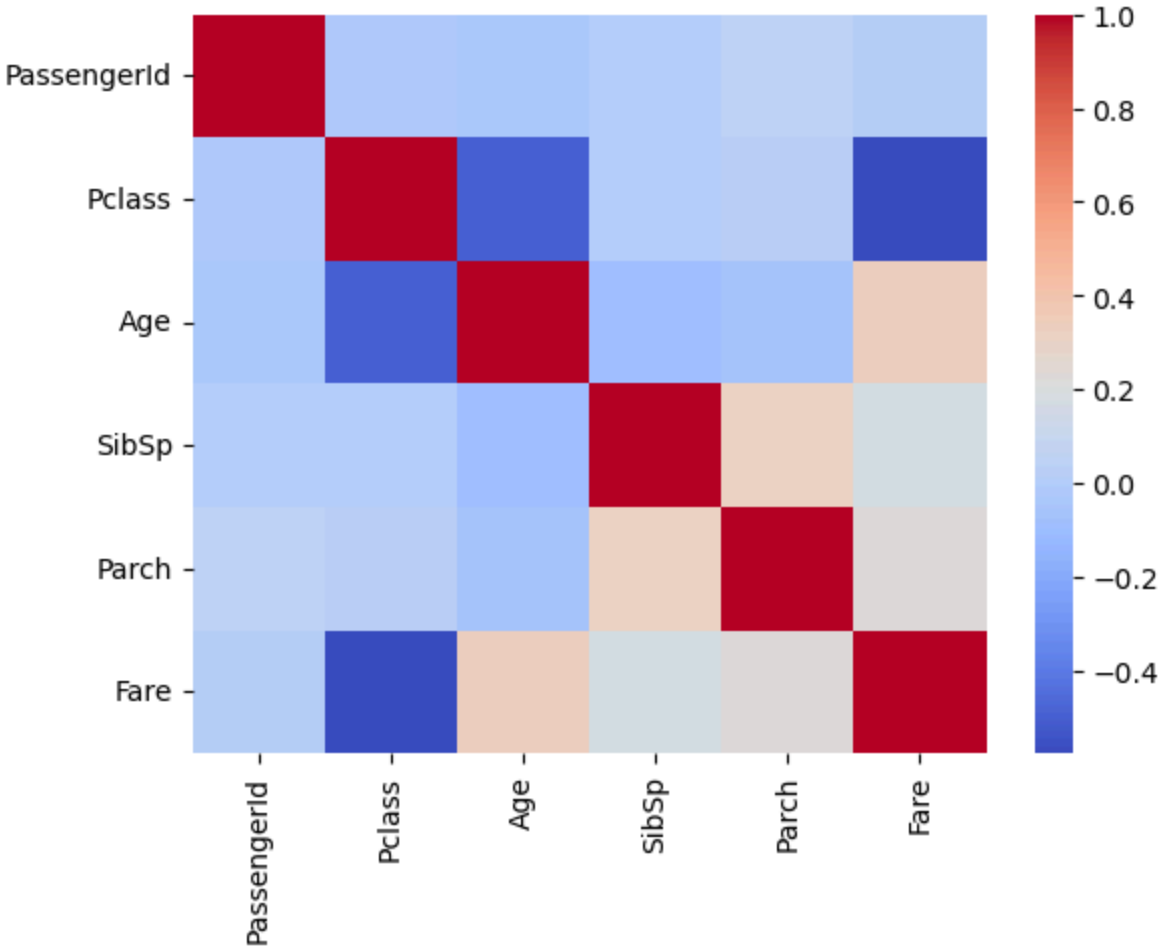
Out[6]:
```
Text(0.5, 0, 'Fare')
```



Exercise 2

In [7]:
```
sns.heatmap(df[['PassengerId', 'Pclass', 'Age', 'SibSp', 'Parch', 'Fare']].corr(),
plt.xticks(rotation=90)
```

Out[7]:
```
(array([0.5, 1.5, 2.5, 3.5, 4.5, 5.5]),
 [Text(0.5, 0, 'PassengerId'),
  Text(1.5, 0, 'Pclass'),
  Text(2.5, 0, 'Age'),
  Text(3.5, 0, 'SibSp'),
  Text(4.5, 0, 'Parch'),
  Text(5.5, 0, 'Fare')])
```



Exercise 3

Find "Pearson correlation" and "Spearman correlation" between "Age" and "Parch" column?

In [8]:
```
age = df['Age'].fillna(df['Age'].mean())
parch = df['Parch'].fillna(df['Parch'].mean())

pearsonr_coefficient, p_value = pearsonr(age, parch)
print('PeasonR Correlation Coefficient %0.3f'% (pearsonr_coefficient))

spearmanr_coefficient, p_value = spearmanr(age, parch)
print('Spearman Rank Correlation Coefficient %0.3f' % (spearmanr_coefficient))
```

```
PeasonR Correlation Coefficient -0.045
Spearman Rank Correlation Coefficient -0.110
```

Exercise 4

Calculate the standard deviation, variance and mean of column "Fare" and "Age"

In [9]:
```
print("Fare Mean:", df['Fare'].mean())
print("Fare Std:", df['Fare'].std())
print("Fare Variance:", df['Fare'].var())
```

```
print('\n')
print("Age Mean:", df['Age'].mean())
print("Age Std:", df['Age'].std())
print("Age Variance:", df['Age'].var())
```

```
Fare Mean: 35.627188489208635
Fare Std: 55.90757617997383
Fare Variance: 3125.6570743195775


Age Mean: 30.272590361445783
Age Std: 14.18120923562442
Age Variance: 201.10669538455937
```

Exercise 5

select Two columns randomly and check the outliers and fix them.

In [10]:
```
df_boston = pd.read_csv('HousingData.csv')
df_boston.head()
```

Out[10]:

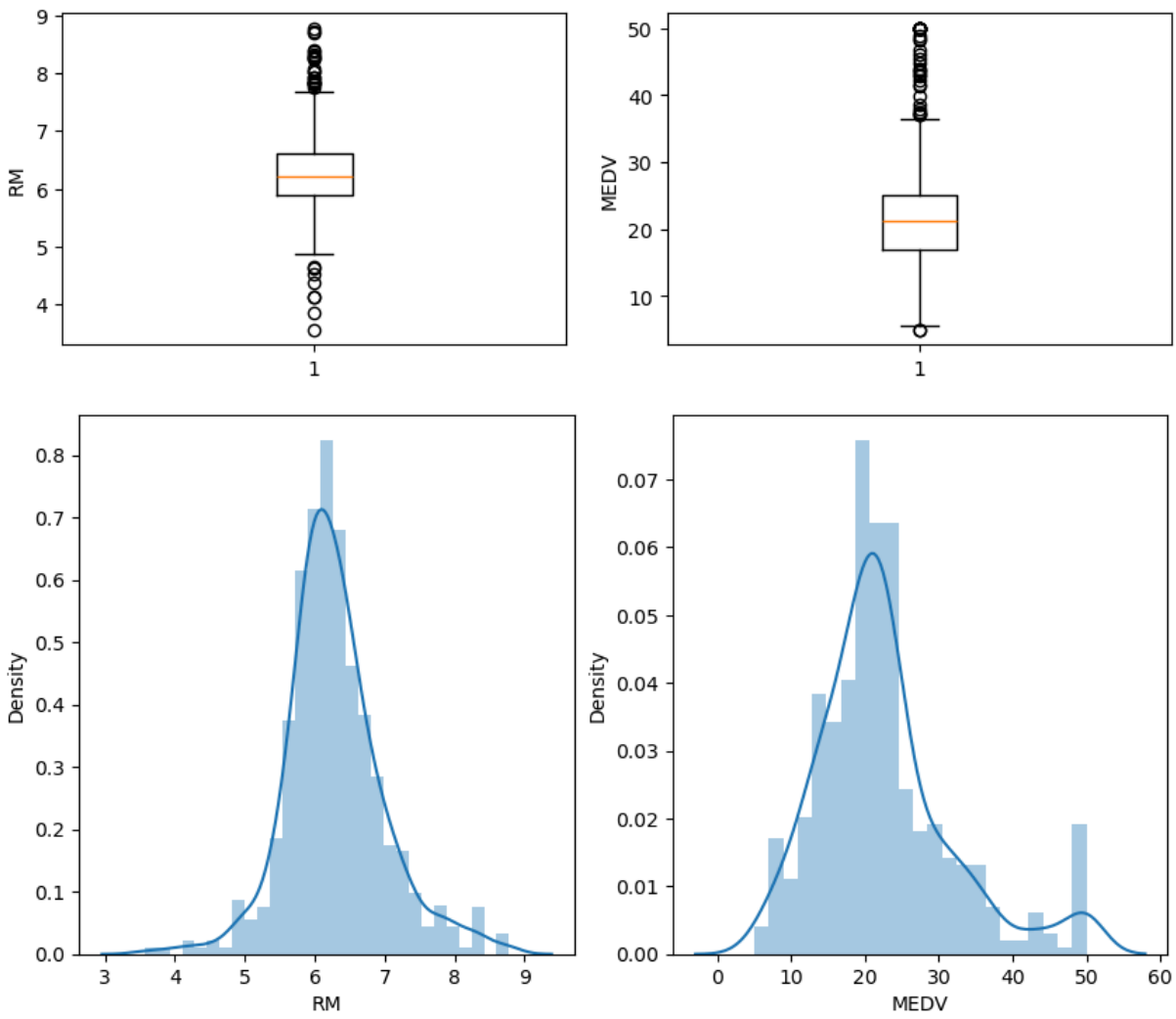
	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	I
0	0.00632	18.0	2.31	0.0	0.538	6.575	65.2	4.0900	1	296	15.3	396.90	
1	0.02731	0.0	7.07	0.0	0.469	6.421	78.9	4.9671	2	242	17.8	396.90	
2	0.02729	0.0	7.07	0.0	0.469	7.185	61.1	4.9671	2	242	17.8	392.83	
3	0.03237	0.0	2.18	0.0	0.458	6.998	45.8	6.0622	3	222	18.7	394.63	
4	0.06905	0.0	2.18	0.0	0.458	7.147	54.2	6.0622	3	222	18.7	396.90	

In [11]:
```
import sklearn
import pandas as pd
import matplotlib.pyplot as plt

RM = df_boston['RM']
MEDV = df_boston['MEDV']

print("RM skew: ", RM.skew())
print("MEDV skew: ", MEDV.skew())
plt.figure(2, figsize=(10,3))
plt.subplot(1,2,1)
plt.boxplot(RM)
plt.ylabel('RM')
plt.subplot(1,2,2)
plt.boxplot(MEDV)
plt.ylabel('MEDV')

plt.figure(figsize=(10,5))
plt.subplot(1,2,1)
sns.distplot(RM)
```

```
plt.subplot(1,2,2)
sns.distplot(MEDV)
```

```
RM skew:  0.40361213328874385
MEDV skew:  1.1080984082549072
```

Out[11]: <Axes: xlabel='MEDV', ylabel='Density'>



We can see a normal distribution in RM but not for MEDV

In [12]:
```
#Lets apply percentile method to RM
upper_limit = RM.quantile(0.99)
lower_limit = RM.quantile(0.01)
print('lower limit: ', lower_limit)
print('upper limit: ', upper_limit)

# Using clip to trim
RM_new = RM.clip(lower=lower_limit, upper=upper_limit)
```

```
lower limit:  4.52445
upper limit:  8.334999999999999
```

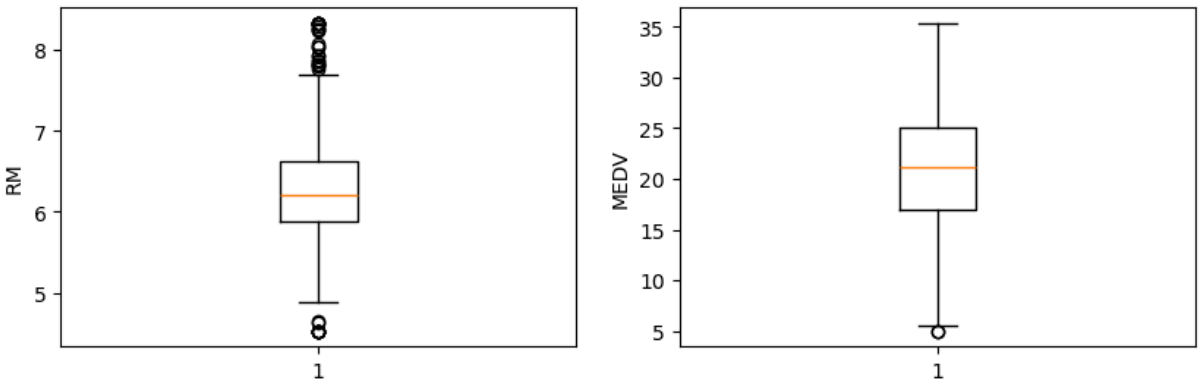
In [16]:
```
# Lets apply IQR to MEDV
Q1 = MEDV.quantile(0.25)
Q3 = MEDV.quantile(0.75)
```

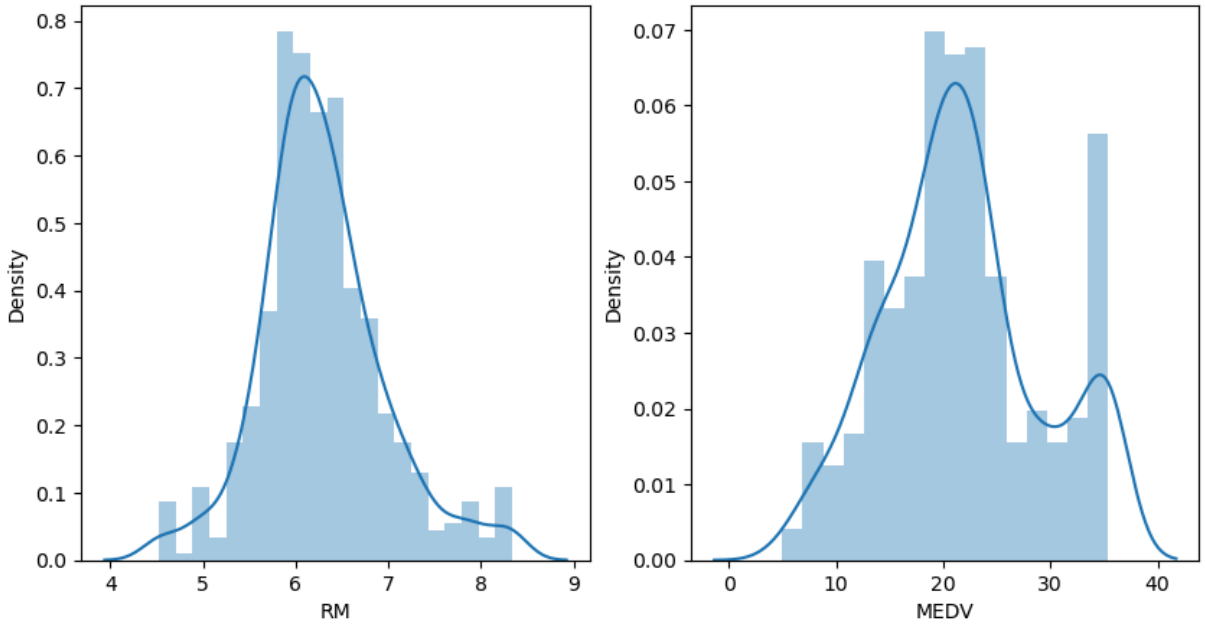
```
IQR = Q3-Q1

# Not using 1.5  to exclude the outliers better
MEDV_upper_limit = Q3+1.3*IQR
MEDV_lower_limit = Q1-1.8*IQR

print('lower limit: ', MEDV_lower_limit)
print('upper limit: ', MEDV_upper_limit)
print('IQR:' , IQR)

# trimming again
MEDV_new = MEDV.clip(lower=MEDV_upper_limit, upper=MEDV_lower_limit)
```

```
lower limit:  2.6699999999999964
upper limit:  35.3675
IQR: 7.975000000000001
```

In [17]:
```
plt.figure(2, figsize=(10,3))
plt.subplot(1,2,1)
plt.boxplot(RM_new)
plt.ylabel('RM')
plt.subplot(1,2,2)
plt.boxplot(MEDV_new)
plt.ylabel('MEDV')

plt.figure(figsize=(10,5))
plt.subplot(1,2,1)
sns.distplot(RM_new)

plt.subplot(1,2,2)
sns.distplot(MEDV_new)
```

Out[17]: <Axes: xlabel='MEDV', ylabel='Density'>





In [19]:
```
# Im not ure why the boxplot for RM is showing outliers, I printed here values abov
print("RM values under lower_limit: ", len(RM_new[RM_new < lower_limit]))
print("RM values above upper_limit", len(RM_new[RM_new > upper_limit]))
print("MEDV values under lower_limit: ", len(MEDV_new[MEDV_new < MEDV_lower_limit])
print("MEDV values above upper_limit", len(MEDV_new[MEDV_new > MEDV_upper_limit]))
```

```
RM values under lower_limit:  0
RM values above upper_limit 0
MEDV values under lower_limit:  0
MEDV values above upper_limit 0
```

In [ ]: