APSSDC

Andhra Pradesh State Skill Development Corporation

(https://apssdc.in)

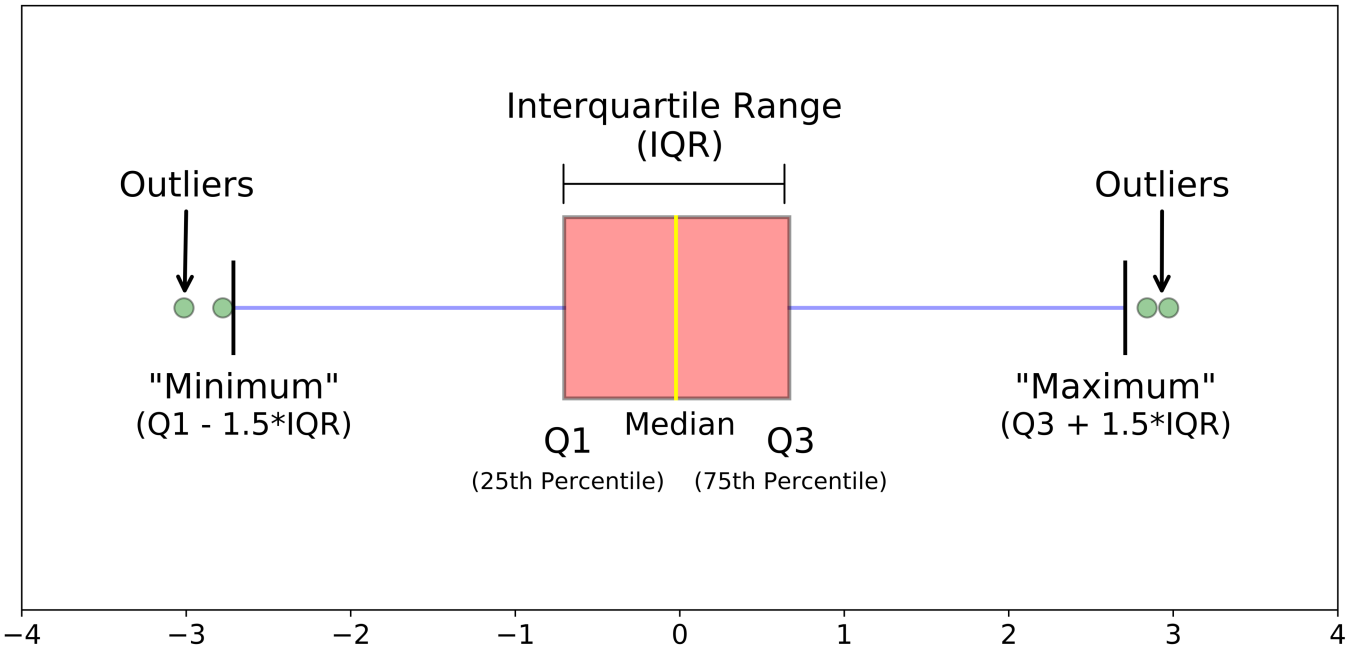
Data Analysis Using Python Day09

Day Objectives

Cleaning Data in Python

- Identifying and Eliminating Outliers
  - Outliers are observations that are significantly different from other data points
  - Outliers can adversely affect the training process of a machine learning algorithm, resulting in a loss of accuracy.
  - Need to use the mathematical formula and retrieve the outlier data.

```
interquartile range(IQR) = Q3(quantile(0.75)) - Q1(quantile(0.25))
```



- Dropping duplicate data
  - drop_duplicates() - Return DataFrame with duplicate rows removed.
- Filling missing data
  - Mean
  - Median
  - Mode
  - Constant
- Applying on raw dataset and introduction to Kaggle and other data sources

Data Preprocessing with Scikit-Learn

- Introduction
- Standardizing Data
- Data Range
- Robust Scaling
- Normalizing Data
- Data Imputation

[Advertisments Dataset Link (https://raw.githubusercontent.com/AP-State-Skill-Development-Corporation/Datasets/master/Advertising.csv)]

In [1]:

```
import pandas as pd
```

In [2]:

```
df = pd.read_csv("https://raw.githubusercontent.com/AP-State-Skill-Development-Corporation/

df.head()
```

Out[2]:

	TV	radio	newspaper	sales
1	230.1	37.8	69.2	22.1
2	44.5	39.3	45.1	10.4
3	17.2	45.9	69.3	9.3
4	151.5	41.3	58.5	18.5
5	180.8	10.8	58.4	12.9

Effect of Outliers on mean and Median

Ex: Stock Analysis

In [3]:

```
import numpy as np
st1 = np.array([5, 5.5, 6, 0.5, 4.5, 5, 6, 5.8])

st2 = np.array([5, 5.5, 6, 5, 4.5, 5, 6, 5.8])
```

In [4]:

```
type(df)
```

Out[4]:

```
pandas.core.frame.DataFrame
```

In [5]:

```
df.shape
```

Out[5]:

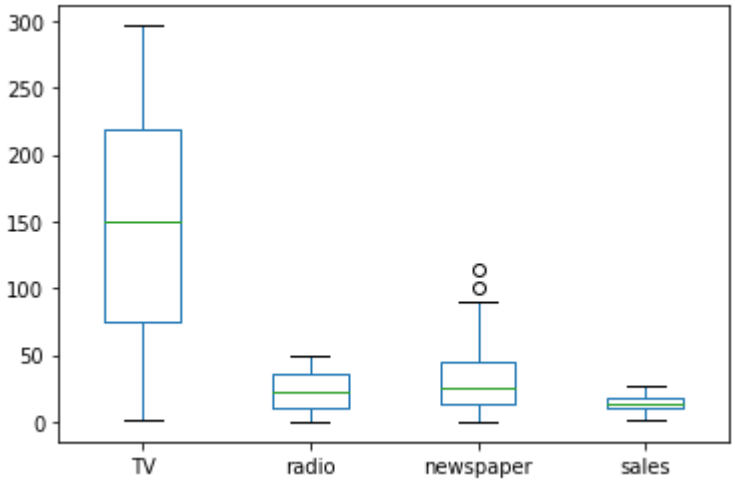
```
(200, 4)
```

In [6]:

```
df.plot(kind = 'box')
```

Out[6]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1e8fe2d97c0>
```



if data > max (1.5 * IQR + Q3) if data < min (Q1 - 1.5 IQR)

In [7]:

```
Q1 = df.quantile(0.25)
Q3 = df.quantile(0.75)

IQR = Q3 - Q1

Q1, Q3, IQR
```

Out[7]:

```
(TV           74.375
 radio         9.975
 newspaper    12.750
 sales        10.375
 Name: 0.25, dtype: float64,
 TV           218.825
 radio         36.525
 newspaper     45.100
 sales         17.400
 Name: 0.75, dtype: float64,
 TV           144.450
 radio         26.550
 newspaper     32.350
 sales          7.025
 dtype: float64)
```

In [8]:

```
filtered_data = df[~((df < (Q1 - 1.5 * IQR)) | (df > (Q3 + 1.5 * IQR))).any(axis=1)]
filtered_data
```

Out[8]:

	TV	radio	newspaper	sales
1	230.1	37.8	69.2	22.1
2	44.5	39.3	45.1	10.4
3	17.2	45.9	69.3	9.3
4	151.5	41.3	58.5	18.5
5	180.8	10.8	58.4	12.9
...	...	...	...	...
196	38.2	3.7	13.8	7.6
197	94.2	4.9	8.1	9.7
198	177.0	9.3	6.4	12.8
199	283.6	42.0	66.2	25.5
200	232.1	8.6	8.7	13.4

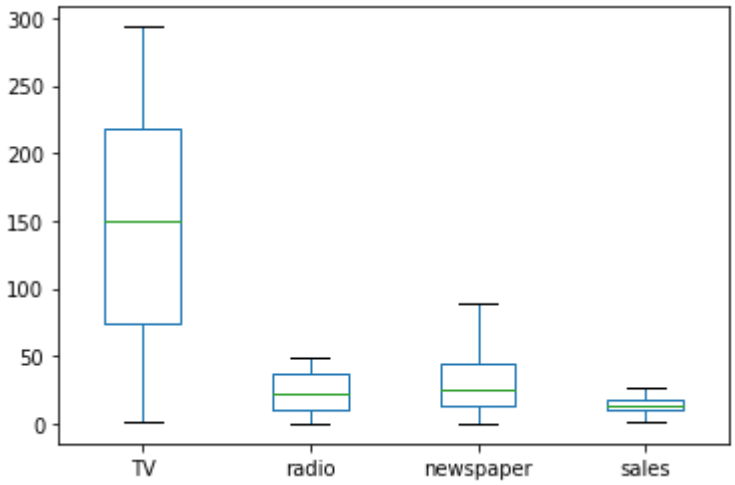
198 rows × 4 columns

In [9]:

```
filtered_data.plot(kind = 'box')
```

Out[9]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1e8fe3f9eb0>
```



Duplicated Data

In [10]:

```
dic = {'cusId':[123,456,987,258,258,987], 'CustNo': [852, 654, 654, 852, 852, 654]}


df1 = pd.DataFrame(dic)

df1
```

Out[10]:

	cusId	CustNo
0	123	852
1	456	654
2	987	654
3	258	852
4	258	852
5	987	654

In [11]:

```
df1.duplicated().sum()
```

Out[11]:

2

In [12]:

```
df1.drop_duplicates()
```

Out[12]:

	cusId	CustNo
0	123	852
1	456	654
2	987	654
3	258	852

Data Proprecessing

1. Standardizing Data

$$Z = \frac{(X_i - mean(X))}{(stdev(x))}$$

In [13]:

```
df.head()
```

Out[13]:

	TV	radio	newspaper	sales
1	230.1	37.8	69.2	22.1
2	44.5	39.3	45.1	10.4
3	17.2	45.9	69.3	9.3
4	151.5	41.3	58.5	18.5
5	180.8	10.8	58.4	12.9

In [14]:

```
df.describe()
```

Out[14]:

	TV	radio	newspaper	sales
count	200.000000	200.000000	200.000000	200.000000
mean	147.042500	23.264000	30.554000	14.022500
std	85.854236	14.846809	21.778621	5.217457
min	0.700000	0.000000	0.300000	1.600000
25%	74.375000	9.975000	12.750000	10.375000
50%	149.750000	22.900000	25.750000	12.900000
75%	218.825000	36.525000	45.100000	17.400000
max	296.400000	49.600000	114.000000	27.000000

mean = 0 std = 1

In [15]:

```
(230.1 - df['TV'].mean())/df['TV'].std()
```

Out[15]:

```
0.9674245973763037
```

In [16]:

```
from sklearn.preprocessing import scale
```

In [18]:

```
std_df = scale(df)
```

In [24]:

```
print("mean of 1st column is:",std_df[:, 0].mean().round(3),"\nstd of 1st column is:", std_
```

```
mean of 1st column is: 0.0
std of 1st column is: 1.0
```

1. Robust Scaler

$$Z = \frac{(X_i - median(X))}{(stdev(x))}$$

In [25]:

```
from sklearn.preprocessing import RobustScaler
```

In [27]:

```
rbs = RobustScaler()

rbs_df = rbs.fit_transform(df)
```

In [28]:

```
print("mean of 1st column is:",rbs_df[:, 0].mean().round(3),"\nstd of 1st column is:", rbs_
```

```
mean of 1st column is: -0.019
std of 1st column is: 0.593
```

3. Data Range

$$x_p = \frac{x - d_{min}}{d_{max} - d_{min}}$$

In [29]:

```
from sklearn.preprocessing import MinMaxScaler
```

In [31]:

```
minmax = MinMaxScaler()

minmax_df = minmax.fit_transform(df)
```

In [32]:

```
print("max of 1st column is:",rbs_df[:, 0].max().round(3),"\nmin of 1st column is:", rbs_df
```

```
max of 1st column is: 1.015
min of 1st column is: -1.032
```