Practical 1

Problem Statement - To apply Preprocessing techniques on raw data set

To perform E.DA.

Libraries used - Numpy
Pandas
Matplot
seaborn
SKlearn

dataset - titanic

Plots used - histograms & Boxplots

train to test split ratio :> 80 : 20

Practical No.1

Data Science and Visualization (Honors Course)

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Class: TE ENTC 'B'

In this practical we will access an open source dataset 'titanic.csv' and apply pre-processing techniques on the raw dataset.

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

We will now check the current version of all the packages which we imported.

In [2]:

```
pd.__version__
```

Out[2]:

```
'1.2.4'
```

In [3]:

```
np.__version__
```

Out[3]:

```
'1.20.1'
```

In [4]:

```
sns.__version__
```

Out[4]:

```
'0.11.1'
```

We will now get the datasets which are already inbuilt in the packages.

In [5]:

```
sns.get_dataset_names()
```

Out[5]:

```
['anagrams',
 'anscombe',
 'attention',
 'brain_networks',
 'car_crashes',
 'diamonds',
 'dots',
 'exercise',
 'flights',
 'fmri',
 'fmri',
 'gammas',
 'geyser',
 'iris',
 'mpg',
 'penguins',
 'planets',
 'taxis',
 'tips',
 'titanic']
```

There are various ways to import a dataset which are as follows:

In [6]:

```
dataset = sns.load_dataset('titanic')
```

In [7]:

```
dataset
```

Out[7]:

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive
0	0	3	male	22.0	1	0	7.2500	S	Third	man	True	NaN	Southampton	no
1	1	1	female	38.0	1	0	71.2833	C	First	woman	False	C	Cherbourg	yes
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	False	NaN	Southampton	yes
3	1	1	female	35.0	1	0	53.1000	S	First	woman	False	C	Southampton	yes
4	0	3	male	35.0	0	0	8.0500	S	Third	man	True	NaN	Southampton	no
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	0	2	male	27.0	0	0	13.0000	S	Second	man	True	NaN	Southampton	no
887	1	1	female	19.0	0	0	30.0000	S	First	woman	False	B	Southampton	yes
888	0	3	female	NaN	1	2	23.4500	S	Third	woman	False	NaN	Southampton	no
889	1	1	male	26.0	0	0	30.0000	C	First	man	True	C	Cherbourg	yes
890	0	3	male	32.0	0	0	7.7500	Q	Third	man	True	NaN	Queenstown	no

891 rows × 15 columns

In [8]:

```
df = pd.read_csv('https://web.stanford.edu/class/archive/cs/cs109/cs109.1166/stuff/titani
c.csv')
```

In [9]:

```
df
```

Out[9]:

	Survived	Pclass	Name	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
0	0	3	Mr. Owen Harris Braund	male	22.0	1	0	7.2500
1	1	1	Mrs. John Bradley (Florence Briggs Thayer) Cum...	female	38.0	1	0	71.2833
2	1	3	Miss. Laina Heikkinen	female	26.0	0	0	7.9250
3	1	1	Mrs. Jacques Heath (Lily May Peel) Futrelle	female	35.0	1	0	53.1000
4	0	3	Mr. William Henry Allen	male	35.0	0	0	8.0500
...	...	...	...	...	...	...	...	...

	Survived	Pclass	Name	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
882	0	2	Rev. Juozas Montvila	male	27.0	0	0	13.0000
883	1	1	Miss. Margaret Edith Graham	female	19.0	0	0	30.0000
884	0	3	Miss. Catherine Helen Johnston	female	7.0	1	2	23.4500
885	1	1	Mr. Karl Howell Behr	male	26.0	0	0	30.0000
886	0	3	Mr. Patrick Dooley	male	32.0	0	0	7.7500

887 rows × 8 columns

We will now perform certain pre processing operations on our dataset.

In [11]:

```
df.columns   #The title of all the columns in the dataset.
```

Out[11]:

```
Index(['Survived', 'Pclass', 'Name', 'Sex', 'Age', 'Siblings/Spouses Aboard',
       'Parents/Children Aboard', 'Fare'],
      dtype='object')
```

In [12]:

```
df.shape
```

Out[12]:

```
(887, 8)
```

In [13]:

```
dataset.shape
```

Out[13]:

```
(891, 15)
```

In [14]:

```
dataset.columns
```

Out[14]:

```
Index(['survived', 'pclass', 'sex', 'age', 'sibsp', 'parch', 'fare',
       'embarked', 'class', 'who', 'adult_male', 'deck', 'embark_town',
       'alive', 'alone'],
      dtype='object')
```

In [16]:

```
df.head()  #the .head() function returns the first five rows of dataset by default.
```

Out[16]:

	Survived	Pclass	Name	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
0	0	3	Mr. Owen Harris Braund	male	22.0	1	0	7.2500
1	1	1	Mrs. John Bradley (Florence Briggs Thayer) Cum...	female	38.0	1	0	71.2833
2	1	3	Miss. Laina Heikkinen	female	26.0	0	0	7.9250
3	1	1	Mrs. Jacques Heath (Lily May Peel) Futrelle	female	35.0	1	0	53.1000
4	0	3	Mr. William Henry Allen	male	35.0	0	0	8.0500

In [17]:

```
dataset.head()
dataset.head()
```

Out[17]:

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alo
0	0	3	male	22.0	1	0	7.2500	S	Third	man	True	NaN	Southampton	no	Fa
1	1	1	female	38.0	1	0	71.2833	C	First	woman	False	C	Cherbourg	yes	Fa
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	False	NaN	Southampton	yes	Tr
3	1	1	female	35.0	1	0	53.1000	S	First	woman	False	C	Southampton	yes	Fa
4	0	3	male	35.0	0	0	8.0500	S	Third	man	True	NaN	Southampton	no	Tr

In [19]:

```
df.tail() #the .tail() function returns the last five rows of dataset by default.
```

Out[19]:

	Survived	Pclass	Name	Sex	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
882	0	2	Rev. Juozas Montvila	male	27.0	0	0	13.00
883	1	1	Miss. Margaret Edith Graham	female	19.0	0	0	30.00
884	0	3	Miss. Catherine Helen Johnston	female	7.0	1	2	23.45
885	1	1	Mr. Karl Howell Behr	male	26.0	0	0	30.00
886	0	3	Mr. Patrick Dooley	male	32.0	0	0	7.75

In [20]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 887 entries, 0 to 886
Data columns (total 8 columns):
 #   Column                   Non-Null Count  Dtype  
---  ------                   --------------  -----  
 0   Survived                 887 non-null    int64  
 1   Pclass                   887 non-null    int64  
 2   Name                     887 non-null    object 
 3   Sex                      887 non-null    object 
 4   Age                      887 non-null    float64
 5   Siblings/Spouses Aboard  887 non-null    int64  
 6   Parents/Children Aboard  887 non-null    int64  
 7   Fare                     887 non-null    float64
dtypes: float64(2), int64(4), object(2)
memory usage: 55.6+ KB
```

In [21]:

```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 15 columns):
 #   Column       Non-Null Count  Dtype   
---  ------       --------------  -----   
 0   survived     891 non-null    int64   
 1   pclass       891 non-null    int64   
 2   sex          891 non-null    object  
 3   age          714 non-null    float64 
 4   sibsp        891 non-null    int64   
 5   parch        891 non-null    int64   
 6   fare         891 non-null    float64 
 7   embarked     889 non-null    object  
 8   class        891 non-null    category
 9   who          891 non-null    object  
 10  adult_male   891 non-null    bool    
 11  deck         203 non-null    category
 12  embark_town  889 non-null    object  
 13  alive        891 non-null    object  
 14  alone        891 non-null    bool    
dtypes: bool(2), category(2), float64(2), int64(4), object(5)
memory usage: 80.7+ KB
```

In [22]:

```
dataset.describe()
```

Out[22]:

	survived	pclass	age	sibsp	parch	fare
count	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [23]:

```
df.describe()
```

Out[23]:

	Survived	Pclass	Age	Siblings/Spouses Aboard	Parents/Children Aboard	Fare
count	887.000000	887.000000	887.000000	887.000000	887.000000	887.00000
mean	0.385569	2.305524	29.471443	0.525366	0.383315	32.30542
std	0.487004	0.836662	14.121908	1.104669	0.807466	49.78204
min	0.000000	1.000000	0.420000	0.000000	0.000000	0.00000
25%	0.000000	2.000000	20.250000	0.000000	0.000000	7.92500
50%	0.000000	3.000000	28.000000	0.000000	0.000000	14.45420
75%	1.000000	3.000000	38.000000	1.000000	0.000000	31.13750
max	1.000000	3.000000	80.000000	8.000000	6.000000	512.32920

In [24]:

```
df.count()
```

Out[24]:

```
Survived                   887
Pclass                     887
Name                       887
Sex                        887
Age                        887
Siblings/Spouses Aboard    887
Parents/Children Aboard    887
Fare                       887
dtype: int64
```

In [25]:

```
dataset.count()
```

Out[25]:

```
survived       891
pclass         891
sex            891
age            714
sibsp          891
parch          891
fare           891
embarked       889
class          891
who            891
adult_male     891
deck           203
embark_town    889
alive          891
alone          891
dtype: int64
```

In [26]:

```
dataset.isnull().sum()
```

Out[26]:

```
survived         0
pclass           0
sex              0
age            177
sibsp            0
parch            0
fare             0
embarked         2
class            0
who              0
adult_male       0
deck           688
embark_town      2
alive            0
alone            0
dtype: int64
```

In [27]:

```
dataset = dataset.drop('deck', axis = 1)
```

In [28]:

```
dataset.isnull().sum()
```

Out[28]:

```
survived         0
pclass           0
sex              0
age            177
sibsp            0
parch            0
fare             0
embarked         2
class            0
who              0
adult_male       0
embark_town      2
alive            0
alone            0
dtype: int64
```

In [29]:

```
dataset['age'] = dataset['age'].fillna(dataset['age'].median())
```

In [30]:

```
dataset.isnull().sum()
```

Out[30]:

```
survived       0
pclass         0
sex            0
age            0
sibsp          0
parch          0
fare           0
embarked       2
class          0
who            0
adult_male     0
embark_town    2
alive          0
alone          0
dtype: int64
```

In [31]:

```
dataset['embarked'].mode()[0]
```

Out[31]:

```
'S'
```

In [32]:

```
dataset['embark_town'].mode()[0]
```

Out[32]:

```
'Southampton'
```

In [33]:

```
dataset['embarked'] = dataset['embarked'].fillna(
    dataset['embarked'].mode()[0])
```

In [34]:

```
dataset['embark_town'] = dataset['embark_town'].fillna(
    dataset['embark_town'].mode()[0])
```

In [35]:

```
dataset.isnull().sum()
```

Out[35]:

```
survived       0
pclass         0
sex            0
age            0
sibsp          0
parch          0
fare           0
embarked       0
class          0
who            0
adult_male     0
embark_town    0
alive          0
alone          0
dtype: int64
```

In [36]:

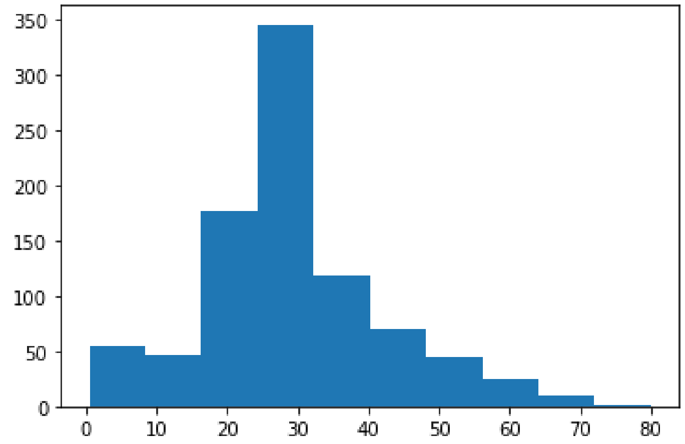
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 14 columns):
 #   Column       Non-Null Count  Dtype   
---  ------       --------------  -----   
 0   survived     891 non-null    int64   
 1   pclass       891 non-null    int64   
 2   sex          891 non-null    object  
 3   age          891 non-null    float64 
 4   sibsp        891 non-null    int64   
 5   parch        891 non-null    int64   
 6   fare         891 non-null    float64 
 7   embarked     891 non-null    object  
 8   class        891 non-null    category
 9   who          891 non-null    object  
 10  adult_male   891 non-null    bool    
 11  embark_town  891 non-null    object  
 12  alive        891 non-null    object  
 13  alone        891 non-null    bool    
dtypes: bool(2), category(1), float64(2), int64(4), object(5)
memory usage: 79.4+ KB
```

Visualization of dataset

In [37]:

```
plt.hist(dataset['age']);
```

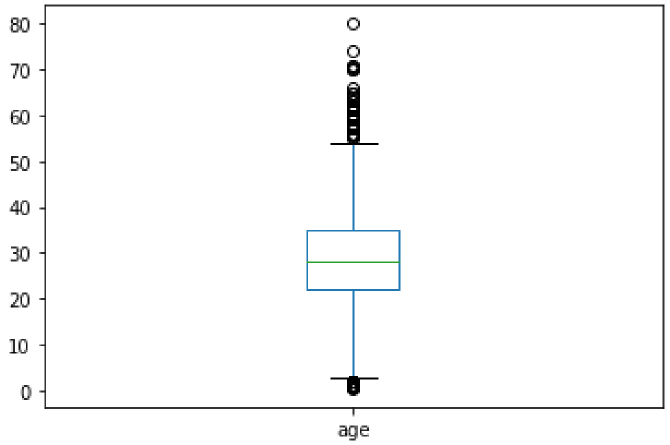


In [38]:

```
dataset['age'].plot(kind='box')
```

Out[38]:

```
<AxesSubplot:>
```

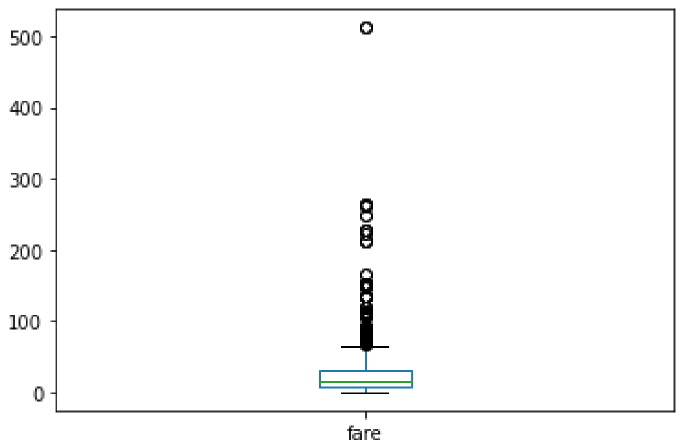


In [39]:

```
dataset['fare'].plot(kind='box')
```

Out[39]:

```
<AxesSubplot:>
```



In [40]:

```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 14 columns):
 #   Column       Non-Null Count  Dtype   
---  ------       --------------  -----   
 0   survived     891 non-null    int64   
 1   pclass       891 non-null    int64   
 2   sex          891 non-null    object  
 3   age          891 non-null    float64 
 4   sibsp        891 non-null    int64   
 5   parch        891 non-null    int64   
 6   fare         891 non-null    float64 
 7   embarked     891 non-null    object  
 8   class        891 non-null    category
 9   who          891 non-null    object  
 10  adult_male   891 non-null    bool    
 11  embark_town  891 non-null    object  
 12  alive        891 non-null    object  
 13  alone        891 non-null    bool    
dtypes: bool(2), category(1), float64(2), int64(4), object(5)
memory usage: 79.4+ KB
```

In [41]:

```
pd.get_dummies(dataset).head()
```

Out[41]:

	survived	pclass	age	sibsp	parch	fare	adult_male	alone	sex_female	sex_male	...	class_Second	class_Third	who
0	0	3	22.0	1	0	7.2500	True	False	0	1	...	0	1	
1	1	1	38.0	1	0	71.2833	False	False	1	0	...	0	0	
2	1	3	26.0	0	0	7.9250	False	True	1	0	...	0	1	
3	1	1	35.0	1	0	53.1000	False	False	1	0	...	0	0	
4	0	3	35.0	0	0	8.0500	True	True	0	1	...	0	1	

5 rows × 24 columns

Training our Dataset

Importing the required library.

In [42]:

```
from sklearn.model_selection import train_test_split
```

In [43]:

```
train, test = train_test_split(dataset,test_size=0.20)
```

In [44]:

```
len(dataset)
```

Out[44]:

```
891
```

In [45]:

```
len(train)
```

Out[45]:

```
712
```

In [46]:

```
len(test)
```

Out[46]:

```
179
```

In [ ]:

```

```

In [ ]:

```

```

In [ ]:

```

```