In [1]:

```
# This Python 3 environment comes with many helpful analytics libraries installed
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/docker-pytho
n
# For example, here's several helpful packages to load

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files
under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/) that gets preserve
d as output when you create a version using "Save & Run All"
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of
the current session
```

```
/kaggle/input/kaartest1/kaar test.csv
/kaggle/input/kaartest1/kaar train.csv
```

In [2]:

```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files
under the input directory

import os
for dirname, _, filenames in os.walk('../input/kaartest1'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```
../input/kaartest1/kaar test.csv
../input/kaartest1/kaar train.csv
```

In [3]:

```
df = pd.read_csv('../input/kaartest1/kaar train.csv')
```

In [4]:

```
df.columns
```

Out[4]:

```
Index(['Gender', 'Age', 'Purchase Amount', 'Sales Amount'], dtype='object')
```

In [5]:

```
df_orig = df.copy()
```

In [6]:

```
df.head()
```

Out[6]:

	Gender	Age	Purchase Amount	Sales Amount
0	Male	18	15	1

	Gender	Age	Purchase Amount	Sales Amount
1	Male	18	15	1
2	Female	18	16	3
3	Female	18	16	4
4	Female	19	17	4

In [7]:

```
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import numpy as np
from sklearn.decomposition import PCA
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor, DecisionTreeClassifier
from sklearn.ensemble import RandomForestRegressor, RandomForestClassifier
from xgboost import XGBRegressor, XGBClassifier
from sklearn.metrics import mean_absolute_error, accuracy_score, classification_report,co
nfusion_matrix
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier, KNeighborsRegressor
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import confusion_matrix,accuracy_score,roc_curve,classification_repo
rt
from sklearn.svm import SVC
from sklearn.naive_bayes import GaussianNB
from sklearn.model_selection import GridSearchCV,RandomizedSearchCV,KFold,StratifiedKFold
import pandas_profiling as pp
import warnings
warnings.filterwarnings('ignore')
import missingno as msno #Visualize null

sns.set_style('ticks') #No grid with ticks
print(sns.__version__)
```

```
0.11.1
```

In [8]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 4 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   Gender           400 non-null    object
 1   Age              400 non-null    int64 
 2   Purchase Amount  400 non-null    int64 
 3   Sales Amount     400 non-null    int64 
dtypes: int64(3), object(1)
memory usage: 12.6+ KB
```

In [9]:

```
df.isna().any()
```

Out[9]:

```
Gender             False
Age                False
Purchase Amount    False
Sales Amount       False
dtype: bool
```

In [10]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 4 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   Gender           400 non-null    object
 1   Age              400 non-null    int64 
 2   Purchase Amount  400 non-null    int64 
 3   Sales Amount     400 non-null    int64 
dtypes: int64(3), object(1)
memory usage: 12.6+ KB
```

In [11]:

```
cols=['Gender','Age','Purchase Amount','Sales Amount']
for i in cols:
  print(df[i].value_counts())
```

```
Female    224
Male      176
Name: Gender, dtype: int64
32    22
35    18
31    16
19    16
30    14
49    14
40    12
38    12
36    12
47    12
23    12
27    12
20    10
48    10
21    10
34    10
50    10
29    10
28     8
24     8
54     8
67     8
59     8
18     8
68     6
60     6
46     6
43     6
45     6
22     6
25     6
39     6
37     6
33     6
58     4
66     4
65     4
63     4
26     4
57     4
44     4
53     4
52     4
51     4
41     4
42     4
70     4
56     2
55     2
64     2
69     2
```

```
Name: Age, dtype: int64
54     24
78     24
48     12
71     12
63     12
       ..
58      4
59      4
16      4
64      4
137     4
Name: Purchase Amount, Length: 64, dtype: int64
42    16
55    14
46    12
73    12
75    10
      ..
63     2
34     2
44     2
45     2
99     2
Name: Sales Amount, Length: 84, dtype: int64
```

In [12]:

```
new_data = df.dropna()
new_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 400 entries, 0 to 399
Data columns (total 4 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   Gender           400 non-null    object
 1   Age              400 non-null    int64 
 2   Purchase Amount  400 non-null    int64 
 3   Sales Amount     400 non-null    int64 
dtypes: int64(3), object(1)
memory usage: 15.6+ KB
```

In [13]:

```
labelencoder = LabelEncoder()

df_max_scaled = new_data.copy()

## FEATURE ENGINEERING
df_max_scaled = df_max_scaled.astype({
    'Gender' : 'category'
})

cat_cols = [i for i  in df_max_scaled.columns if df_max_scaled[i].dtype not in ['int64',
'float64']]

for col in cat_cols:
  df_max_scaled[col + "-cat"] = labelencoder.fit_transform(df_max_scaled[col])

num_cols = [col for col in df_max_scaled.columns if df_max_scaled[col].dtype in ['int',
'float']]

for i in cat_cols:
  df_max_scaled.drop([i], axis= 1, inplace= True)

for col in num_cols:
  df_max_scaled[col] = df_max_scaled[col] / df_max_scaled[col].abs().max()

df_max_scaled.head()
```

Out[13]:

	Age	Purchase Amount	Sales Amount	Gender-cat
0	0.257143	0.109489	0.010101	1.0
1	0.257143	0.109489	0.010101	1.0
2	0.257143	0.116788	0.030303	0.0
3	0.257143	0.116788	0.040404	0.0
4	0.271429	0.124088	0.040404	0.0

In [14]:

```
num_cols = [col for col in df_max_scaled.columns if df_max_scaled[col].dtype in ['int64'
,'float64']]

cat_cols = [col for col in df_max_scaled.columns if df_max_scaled[col].dtype not in ['int
64', 'float64']]
```

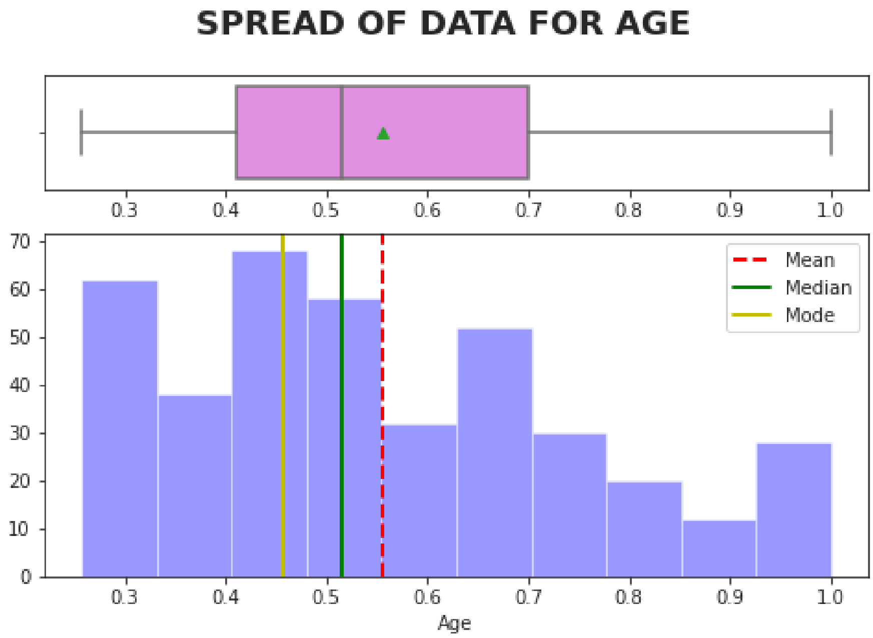
In [15]:

```
def dist_box(data):
 # function plots a combined graph for univariate analysis of continous variable
 #to check spread, central tendency , dispersion and outliers
    Name=data.name.upper()
    fig,(ax_box,ax_dis)  =plt.subplots(2,1,gridspec_kw = {"height_ratios": (.25, .75)},f
igsize=(8, 5))
    mean=data.mean()
    median=data.median()
    mode=data.mode().tolist()[0]
    fig.suptitle("SPREAD OF DATA FOR "+ Name  , fontsize=18, fontweight='bold')
    sns.boxplot(x=data,showmeans=True, orient='h',color="violet",ax=ax_box)
    ax_box.set(xlabel='')
    sns.distplot(data,kde=False,color='blue',ax=ax_dis)
    ax_dis.axvline(mean, color='r', linestyle='--',linewidth=2)
    ax_dis.axvline(median, color='g', linestyle='-',linewidth=2)
    ax_dis.axvline(mode, color='y', linestyle='-',linewidth=2)
    plt.legend({'Mean':mean,'Median':median,'Mode':mode})
```

In [16]:

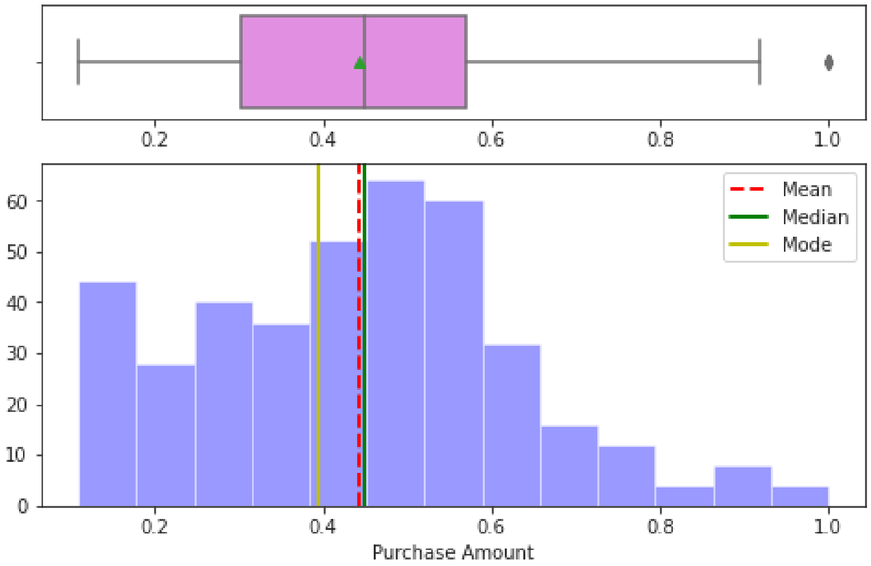
```
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

for i in range(len(num_cols)):
    dist_box(df_max_scaled[num_cols[i]])
```

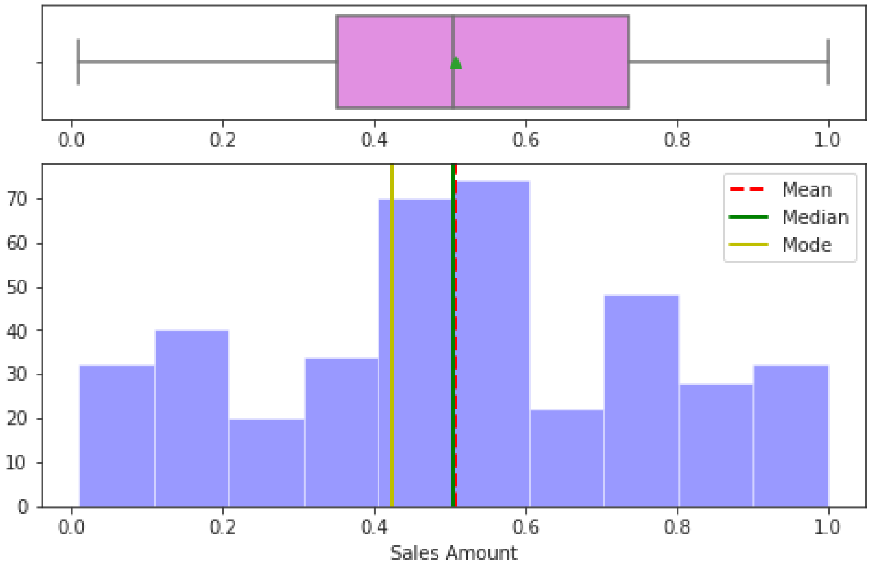


SPREAD OF DATA FOR PURCHASE AMOUNT

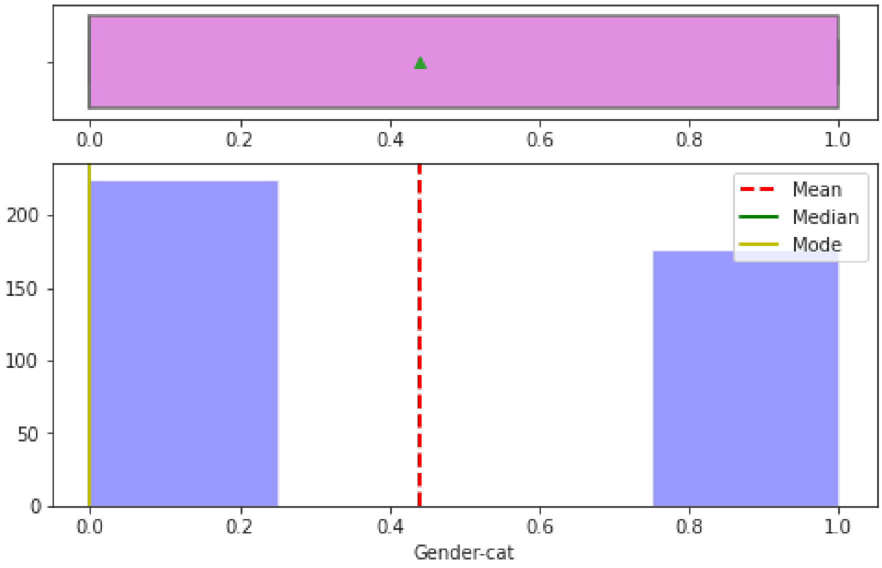
SPREAD OF DATA FOR PURCHASE AMOUNT



SPREAD OF DATA FOR SALES AMOUNT



SPREAD OF DATA FOR GENDER-CAT



In [17]:

```
data = df_max_scaled.drop_duplicates()
data.head()
```

Out[17]:

	Age	Purchase Amount	Sales Amount	Gender-cat
0	0.257143	0.109489	0.010101	1.0
2	0.257143	0.116788	0.030303	0.0
3	0.257143	0.116788	0.040404	0.0
4	0.271429	0.124088	0.040404	0.0
5	0.271429	0.124088	0.050505	0.0

In [18]:

```
y = data["Sales Amount"]
X = data.drop('Sales Amount',axis=1)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.5)
```

In [19]:

```
df_max_scaled.shape
```

Out[19]:

```
(400, 4)
```

In [20]:

```
from sklearn import preprocessing
from sklearn import utils
lab_enc = preprocessing.LabelEncoder()
training_scores_encoded = lab_enc.fit_transform(y_train)
print(utils.multiclass.type_of_target(y_train))
print(utils.multiclass.type_of_target(y_train.astype('int')))
print(utils.multiclass.type_of_target(training_scores_encoded))
```

```
continuous
binary
multiclass
```

In [21]:

```
lab_enc = preprocessing.LabelEncoder()
training_scores_encoded1 = lab_enc.fit_transform(y_test)
print(utils.multiclass.type_of_target(y_test))
print(utils.multiclass.type_of_target(y_test.astype('int')))
print(utils.multiclass.type_of_target(training_scores_encoded1))
```

```
continuous
binary
multiclass
```

In [22]:

```
m1 = 'Random Forest Classfier'
rf = RandomForestClassifier(n_estimators=20, max_depth=5)
rf.fit(X_train,training_scores_encoded)
rf_predicted = rf.predict(X_test)
rf_conf_matrix = confusion_matrix(training_scores_encoded1, rf_predicted)
rf_acc_score = accuracy_score(training_scores_encoded1, rf_predicted)
print("confussion matrix")
print(rf_conf_matrix)
print("\n")
print("Accuracy of Random Forest:",rf_acc_score*100,'\n')
print(classification_report(training_scores_encoded1,rf_predicted))

kfold = KFold(n_splits=10, random_state=None)
cv_results = cross_val_score(rf, X_train, training_scores_encoded, cv=kfold, scoring='ac
curacy')
msg = "%s: %f (%f)" % (m1, cv_results.mean(), cv_results.std())
print(msg)
```

```
confussion matrix
```

```
[[1 0 0 ... 0 0 0]
 [1 0 0 ... 0 0 0]
 [2 0 0 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]


Accuracy of Random Forest: 1.2658227848101267

              precision    recall  f1-score   support

           0       0.11      1.00      0.20         1
           1       0.00      0.00      0.00         1
           2       0.00      0.00      0.00         2
           3       0.00      0.00      0.00         1
           4       0.00      0.00      0.00         2
           5       0.00      0.00      0.00         1
           6       0.00      0.00      0.00         1
           7       0.00      0.00      0.00         1
           8       0.00      0.00      0.00         1
           9       0.00      0.00      0.00         1
          10       0.00      0.00      0.00         3
          11       0.00      0.00      0.00         1
          12       0.00      0.00      0.00         1
          13       0.00      0.00      0.00         1
          14       0.00      0.00      0.00         1
          15       0.00      0.00      0.00         2
          16       0.00      0.00      0.00         1
          17       0.00      0.00      0.00         1
          18       0.00      0.00      0.00         1
          19       0.00      0.00      0.00         1
          20       0.00      0.00      0.00         1
          21       0.00      0.00      0.00         1
          22       0.00      0.00      0.00         2
          23       0.00      0.00      0.00         2
          24       0.00      0.00      0.00         1
          25       0.00      0.00      0.00         2
          26       0.00      0.00      0.00         2
          27       0.00      0.00      0.00         2
          28       0.00      0.00      0.00         1
          29       0.00      0.00      0.00         1
          30       0.00      0.00      0.00         3
          31       0.00      0.00      0.00         3
          32       0.00      0.00      0.00         1
          33       0.00      0.00      0.00         2
          34       0.00      0.00      0.00         1
          35       0.00      0.00      0.00         2
          36       0.00      0.00      0.00         1
          37       0.00      0.00      0.00         1
          38       0.00      0.00      0.00         1
          39       0.00      0.00      0.00         1
          40       0.00      0.00      0.00         1
          41       0.00      0.00      0.00         2
          42       0.00      0.00      0.00         1
          43       0.00      0.00      0.00         1
          44       0.00      0.00      0.00         1
          45       0.00      0.00      0.00         1
          46       0.00      0.00      0.00         2
          47       0.00      0.00      0.00         2
          48       0.00      0.00      0.00         1
          49       0.00      0.00      0.00         2
          50       0.00      0.00      0.00         1
          51       0.00      0.00      0.00         1
          52       0.00      0.00      0.00         1
          53       0.00      0.00      0.00         1
          54       0.00      0.00      0.00         1
          55       0.00      0.00      0.00         2
          56       0.00      0.00      0.00         1
          57       0.00      0.00      0.00         1
```

```
    accuracy                           0.01        79
   macro avg       0.00      0.02      0.00        79
weighted avg       0.00      0.01      0.00        79

Random Forest Classfier: 0.176786 (0.113908)
```

In [23]:

```
import pickle
pickle.dump(rf, open('rfmodel.pkl','wb'))
```

In [24]:

```
loaded_model=pickle.load(open('./rfmodel.pkl','rb'))
```

In [25]:

```
loaded_model.predict([np.array([1,19,19])])[0]
```

Out[25]:

```
50
```

In [ ]:

```

```