Feature Engineering > Feature Transfofrmation

Outliers Handling

Inter-Quartile Range (IQR)-->For left or right skewed data

Importing Dependencies

In [22]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
%matplotlib inline
```

Loading Data

In [23]:
```
#load data
df1=pd.read_csv('placement.csv')
#first 5 rows
df1.head()
```

Out[23]:

	cgpa	placement_exam_marks	placed
0	7.19	26.0	1
1	7.46	38.0	1
2	7.54	40.0	1
3	6.42	8.0	1
4	7.23	17.0	0

In [24]:
```
#shape
df1.shape
```

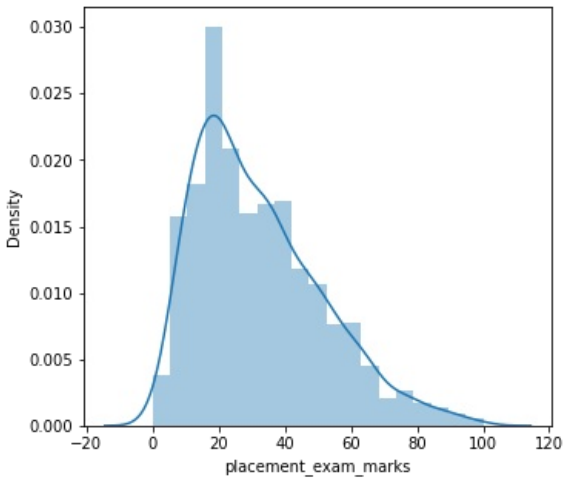
Out[24]:
```
(1000, 3)
```

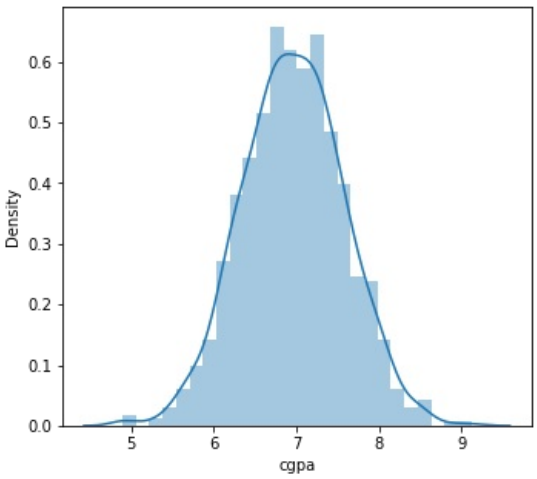
In [25]:
```
#basic information(data-types, missing values)
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 3 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   cgpa                  1000 non-null   float64
 1   placement_exam_marks  1000 non-null   float64
 2   placed                1000 non-null   int64  
dtypes: float64(2), int64(1)
memory usage: 23.6 KB
```

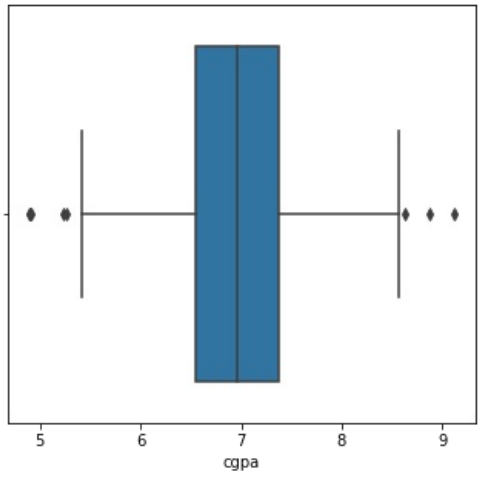
Graphical Analysis

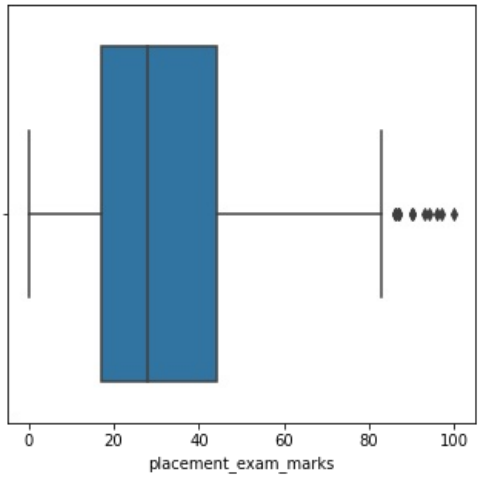
In [27]:
```
#distplot of 'cgpa' and 'placement_exam_marks'
plt.figure(figsize=(12,5))

plt.subplot(1,2,1)
sns.distplot(df1['placement_exam_marks'])
plt.subplot(1,2,2)
sns.distplot(df1['cgpa'])
plt.show()
#observation-->'cgpa' is sort of normally distributed
#observation-->'placement_exam_marks' is right skewed and has right outliers
```





In [28]:
```
#boxplot of 'cgpa' and 'placement_exam_marks'
plt.figure(figsize=(12,5))

plt.subplot(1,2,1)
sns.boxplot(df1['cgpa'])
plt.subplot(1,2,2)
sns.boxplot(df1['placement_exam_marks'])
plt.show()
#observation-->'cgpa' is sort of normally distributed
#observation-->'placement_exam_marks' is right skewed and has right outliers
```





so here we will focus on 'placement_exam_marks' being right skewed data

In [29]:
```
#'placement_exam_marks' statistical description
df1['placement_exam_marks'].describe()
```

Out[29]:
```
count    1000.000000
mean       32.225000
std        19.130822
min         0.000000
25%        17.000000
50%        28.000000
75%        44.000000
max       100.000000
Name: placement_exam_marks, dtype: float64
```

IQR (for skewed data)

In [7]:
```
#'placement_exam_marks' is right skewed-->IQR
q1=df1['placement_exam_marks'].quantile(0.25)
q3=df1['placement_exam_marks'].quantile(0.75)
IQR=q3-q1
lower_limit=q1-1.5*IQR
upper_limit=q3+1.5*IQR
```

```
print(lower_limit, upper_limit)
```

```
-23.5 84.5
```

In [32]:

```
#'placement_exam_marks'(right skewed distributed)-->(q1-1.5*IQR, q3+1.5*IQR)
df1[(df1['placement_exam_marks']<lower_limit) | (df1['placement_exam_marks']>upper_limit)]
#print(len(df1[(df1['placement_exam_marks']<lower_limit) | (df1['placement_exam_marks']>upper_limit)]))
#observation-->filter data having outliers(15-rows)
```

Out[32]:

	cgpa	placement_exam_marks	placed
9	7.75	94.0	1
40	6.60	86.0	1
61	7.51	86.0	0
134	6.33	93.0	0
162	7.80	90.0	0
283	7.09	87.0	0
290	8.38	87.0	0
311	6.97	87.0	1
324	6.64	90.0	0
630	6.56	96.0	1
685	6.05	87.0	1
730	6.14	90.0	1
771	7.31	86.0	1
846	6.99	97.0	0
917	5.95	100.0	0

Trimming (remove outliers)

In [33]:

```
#Trimming using lower and  upper fence (q1-1.5*IQR, q3+1.5*IQR)
df2=df1.drop(df1[(df1['placement_exam_marks']<lower_limit) | (df1['placement_exam_marks']>upper_limit)].index)
df2
#observation-->985=(1000-15)
```

Out[33]:

	cgpa	placement_exam_marks	placed
0	7.19	26.0	1
1	7.46	38.0	1
2	7.54	40.0	1
3	6.42	8.0	1
4	7.23	17.0	0
...	...	...	...
995	8.87	44.0	1
996	9.12	65.0	1
997	4.89	34.0	0
998	8.62	46.0	1
999	4.90	10.0	1

985 rows × 3 columns

In [36]:

```
#before trimming description of ''placement_exam_marks''
df1['cgpa'].describe()
```

Out[36]:

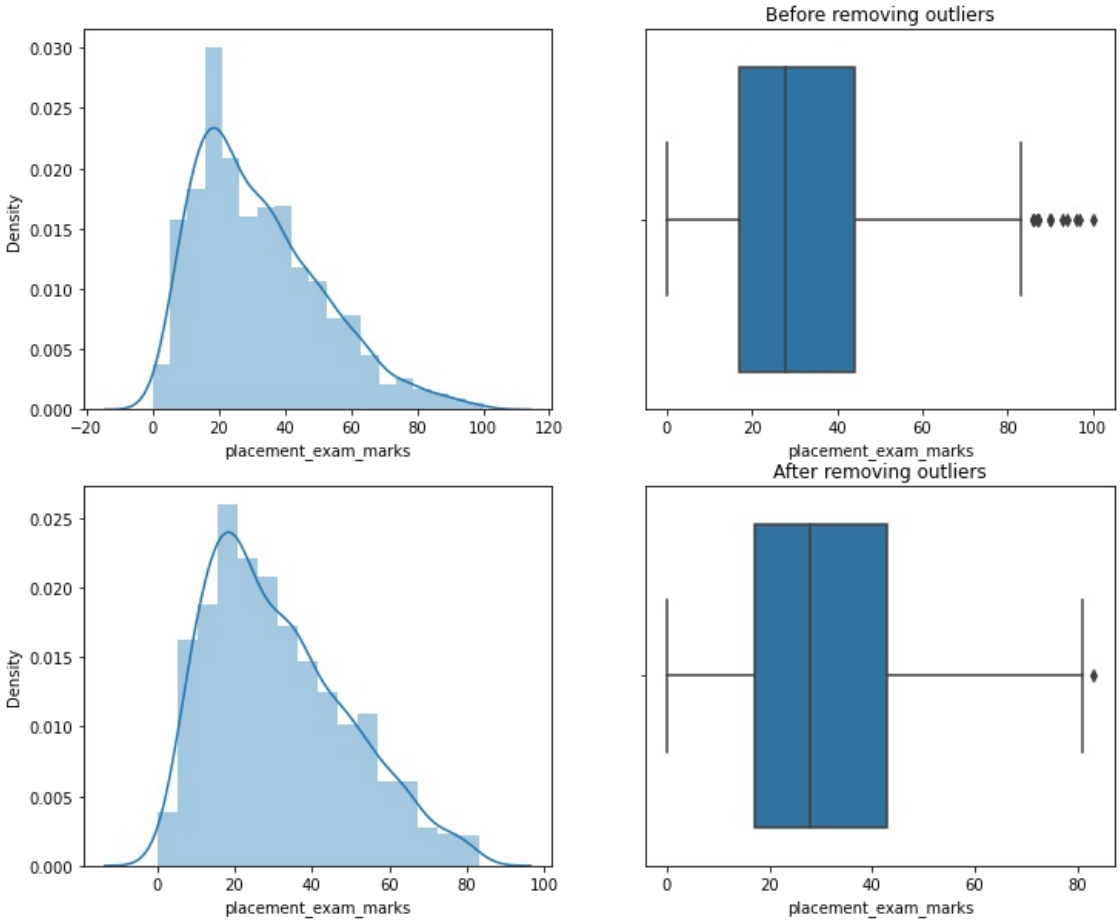
```
count    1000.000000
mean        6.961240
std         0.615898
min         4.890000
25%         6.550000
50%         6.960000
75%         7.370000
max         9.120000
```

```
Name: cgpa, dtype: float64
```

In [37]:
```
#after trimming description of ''placement_exam_marks''
df2['cgpa'].describe()
```

Out[37]:
```
count    985.000000
mean       6.961594
std        0.614734
min        4.890000
25%        6.550000
50%        6.960000
75%        7.370000
max        9.120000
Name: cgpa, dtype: float64
```

In [38]:
```
#distplot and boxplot of 'placement_exam_marks' before and after triming outliers

plt.figure(figsize=(12,10))
plt.subplot(2,2,1)
sns.distplot(df1['placement_exam_marks'])
plt.subplot(2,2,2)
sns.boxplot(df1['placement_exam_marks'])
plt.title("Before removing outliers", loc='center')

plt.subplot(2,2,3)
sns.distplot(df2['placement_exam_marks'])
plt.subplot(2,2,4)
sns.boxplot(df2['placement_exam_marks'])
plt.title("After removing outliers", loc='center')

plt.show()
#observation-->one outlier is still left(maybe data cleaning is required)
```



Capping (set lower and upper bound values to outliers)

In [10]:
```
#Capping
print(lower_limit, upper_limit)
```

```
-23.5 84.5
```

In [39]:
```
#setting lower and upper limit values on outliers using np.where
df1['placement_exam_marks_new']=np.where(df1['placement_exam_marks']<lower_limit, lower_limit,
                                         np.where(df1['placement_exam_marks']>upper_limit, upper_limit, df1['placement
#into array
```

In [43]:
```
#'cgpa' and 'cgpa_new' data description
df1[['placement_exam_marks', 'placement_exam_marks_new']].describe().T
```

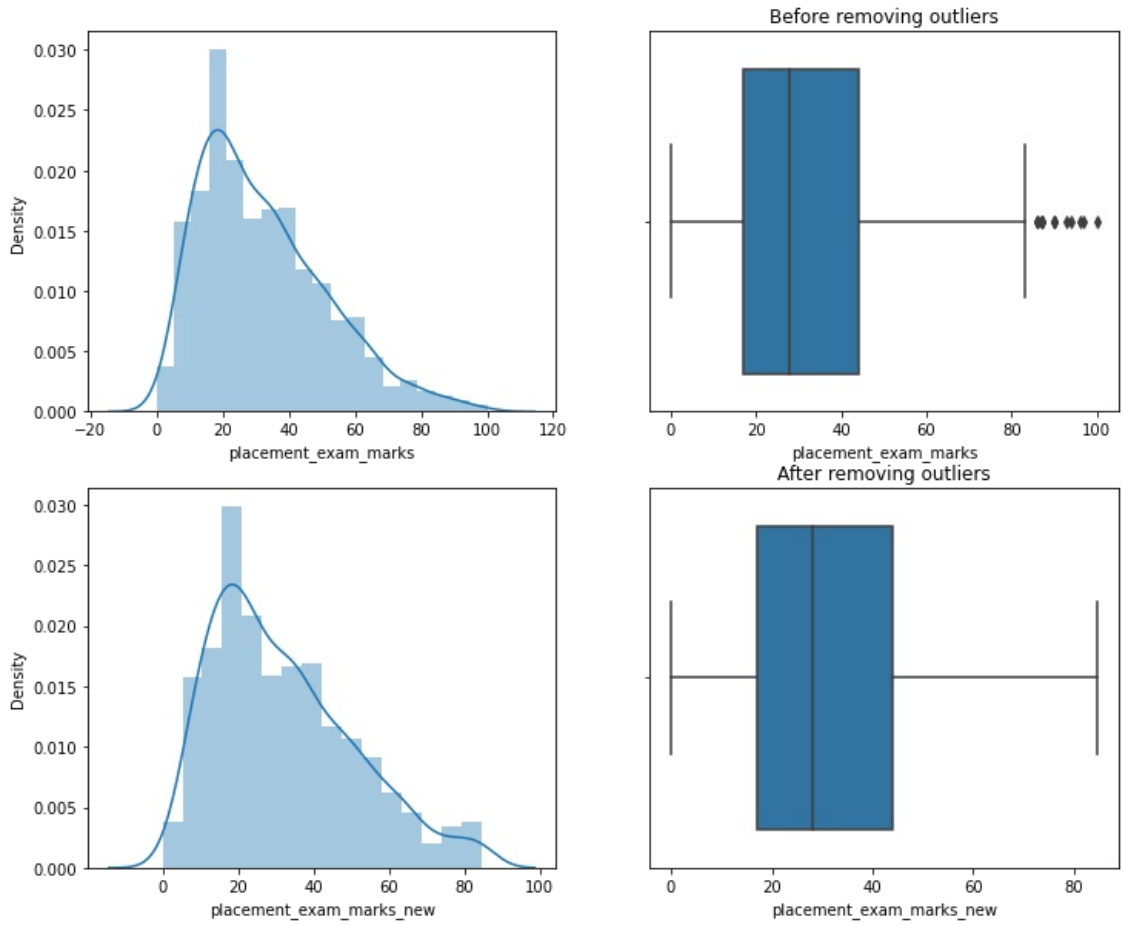
Out[43]:

	count	mean	std	min	25%	50%	75%	max
placement_exam_marks	1000.0	32.2250	19.130822	0.0	17.0	28.0	44.0	100.0
placement_exam_marks_new	1000.0	32.1365	18.865419	0.0	17.0	28.0	44.0	84.5

In [45]:
```
#shape(no rows are removd here, instead outliers are set to new values)
df1.shape
```

Out[45]:
```
(1000, 4)
```

In [47]:
```
#distplot and boxplot of 'placement_exam_marks' before and after capping outliers

plt.figure(figsize=(12, 10))
plt.subplot(2,2,1)
sns.distplot(df1['placement_exam_marks'])
plt.subplot(2,2,2)
sns.boxplot(df1['placement_exam_marks'])
plt.title("Before removing outliers", loc='center')

plt.subplot(2,2,3)
sns.distplot(df1['placement_exam_marks_new'])
plt.subplot(2,2,4)
sns.boxplot(df1['placement_exam_marks_new'])
plt.title("After removing outliers", loc='center')

plt.show()
#observation-->'placement_exam_marks' some outliers removed
```



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