practical-exam-03-04

May 23, 2023

[ ]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call
drive.mount("/content/drive", force_remount=True).
```

1 Problem Statement 3 and 4

Perform the following operations using Python on "Academic performance" dataset
1. Scan all variables for missing values and inconsistencies. If there are missing values and/or inconsistencies, use any of the suitable techniques to deal with them.
2. Scan all numeric variables for outliers. If there are outliers, use any of the suitable techniques to deal with them. 3. Apply data transformations on at least one of the variables. The purpose of this transformation should be one of the following reasons: to change the scale for better understanding of the variable, to convert a non-linear relation into a linear one, or to decrease the skewness and convert the distribution into a normal distribution.

[215]:
```
import pandas as pd
```

```
<IPython.core.display.HTML object>
```

[216]:
```
df = pd.read_csv('/content/drive/MyDrive/Colab Notebooks/exam_datasets/3-4.␣
↪AcademicPerformance.csv')
```

```
<IPython.core.display.HTML object>
```

[217]:
```
df.info()
```

```
<IPython.core.display.HTML object>
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Rollno  100 non-null    int64
 1   Marks   100 non-null    float64
 2   Gender  100 non-null    int64
 3   Age     84 non-null     float64
```

```
 4   PhD     87 non-null     object
dtypes: float64(2), int64(2), object(1)
memory usage: 4.0+ KB
```

[218]:
```
df['PhD'] = df['PhD'].fillna('No')
```

```
<IPython.core.display.HTML object>
```

```
<ipython-input-218-0a7b6e88cc8f>:1: FutureWarning: The default value of
numeric_only in DataFrame.mean is deprecated. In a future version, it will
default to False. In addition, specifying 'numeric_only=None' is deprecated.
Select only valid columns or specify the value of numeric_only to silence this
warning.
  df['Age'] = df['Age'].fillna(df.mean())
```

[219]:
```
df.isnull().sum()
```

```
<IPython.core.display.HTML object>
```

[219]:
```
Rollno     0
Marks      0
Gender     0
Age       16
PhD        0
dtype: int64
```

[222]:
```
df = df.fillna(df.mean())
```

```
<IPython.core.display.HTML object>
```

```
<ipython-input-222-04e87d67d337>:1: FutureWarning: The default value of
numeric_only in DataFrame.mean is deprecated. In a future version, it will
default to False. In addition, specifying 'numeric_only=None' is deprecated.
Select only valid columns or specify the value of numeric_only to silence this
warning.
  df = df.fillna(df.mean())
```

[223]:
```
df.isnull().sum()
```

```
<IPython.core.display.HTML object>
```

[223]:
```
Rollno    0
Marks     0
Gender    0
Age       0
PhD       0
dtype: int64
```

[224]:
```
import numpy as np
numeric_cols = df.select_dtypes(include=[np.number]).columns

for col in numeric_cols:
    Q1 = df[col].quantile(0.25)
    Q3 = df[col].quantile(0.75)
    IQR = Q3 - Q1
    lower_bound = Q1 - 1.5 * IQR
    upper_bound = Q3 + 1.5 * IQR
    outliers = df[(df[col] < lower_bound) | (df[col] > upper_bound)]
    print(f'Outliers in {col}:')
    print(outliers)
```

```
<IPython.core.display.HTML object>
```

```
Outliers in Rollno:
Empty DataFrame
Columns: [Rollno, Marks, Gender, Age, PhD]
Index: []
Outliers in Marks:
    Rollno  Marks  Gender   Age  PhD
18      19  190.0       1  66.0  Yes
56      57  160.0       1  61.0  Yes
Outliers in Gender:
Empty DataFrame
Columns: [Rollno, Marks, Gender, Age, PhD]
Index: []
Outliers in Age:
Empty DataFrame
Columns: [Rollno, Marks, Gender, Age, PhD]
Index: []
```

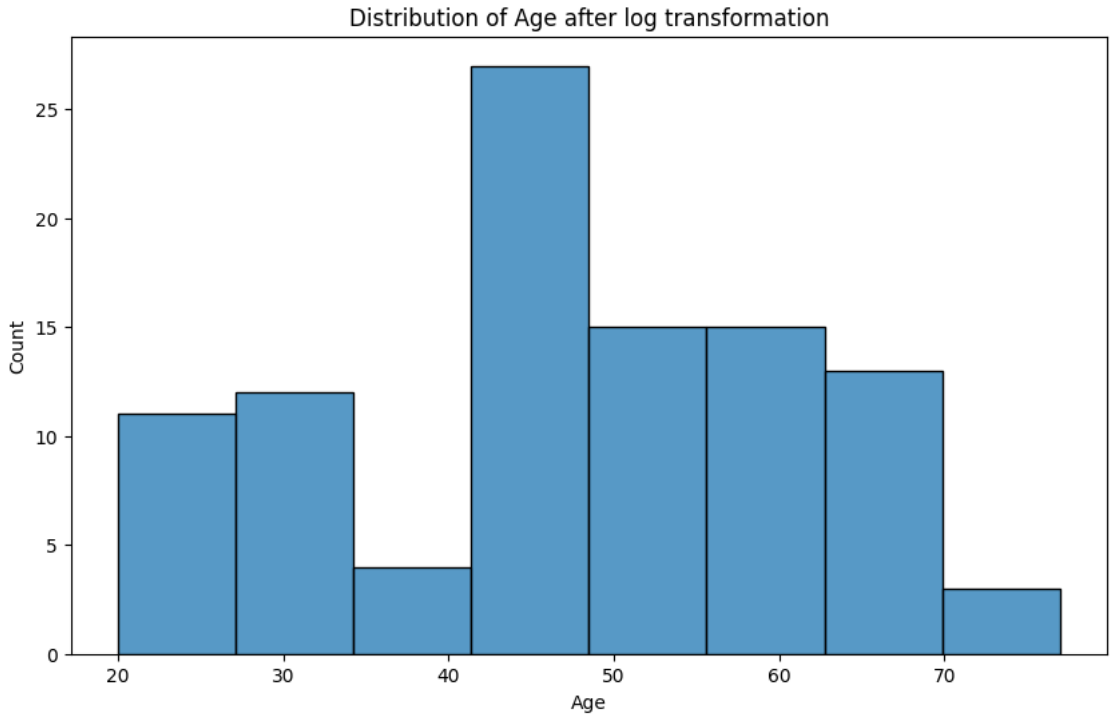
[225]:
```
df[col] = np.where(df[col] < lower_bound, lower_bound, df[col])
df[col] = np.where(df[col] > upper_bound, upper_bound, df[col])
```

```
<IPython.core.display.HTML object>
```

[226]:
```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(10, 6))
sns.histplot(df[col])
plt.title(f'Distribution of {col} after log transformation')
plt.show()
```

```
<IPython.core.display.HTML object>
```



[227]:
```
col = 'Age'

# Change the scale using min-max normalization
df[col] = (df[col] - df[col].min()) / (df[col].max() - df[col].min())

# Convert a non-linear relation into a linear one using log transformation
df[col] = np.log(df[col])

# Decrease skewness and convert the distribution into a normal distribution␣
 ↪using square root transformation
df[col] = np.sqrt(df[col])
```

```
<IPython.core.display.HTML object>
```

```
/usr/local/lib/python3.10/dist-packages/pandas/core/arraylike.py:402:
RuntimeWarning: divide by zero encountered in log
  result = getattr(ufunc, method)(*inputs, **kwargs)
/usr/local/lib/python3.10/dist-packages/pandas/core/arraylike.py:402:
RuntimeWarning: invalid value encountered in sqrt
  result = getattr(ufunc, method)(*inputs, **kwargs)
```

[228]:
```
plt.figure(figsize=(10, 6))
sns.histplot(df[col])
plt.title(f'Distribution of {col} after log transformation')
```

```
plt.show()
```

```
<IPython.core.display.HTML object>
```