utrjp0mq4

April 29, 2025

[16]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[17]:
```
# Create sample dataset
data = {
    'Student ID': [1, 2, 3, 4, 5],
    'Age': [18, 20, np.nan, 19, 22],
    'Gender': ['Male', 'Female', 'Female', 'Male', 'Male'],
    'Exam Score': [90, 85, 75, 95, 65],
    'Study Hours': [4, 6, 8, np.nan, 5],
    'Attendance Percentage': [80, 95, 85, 70, 60]
}

df = pd.DataFrame(data)
```

[18]:
```
# print dataset
df
```

[18]:

	Student ID	Age	Gender	Exam Score	Study Hours	Attendance Percentage
0	1	18.0	Male	90	4.0	80
1	2	20.0	Female	85	6.0	95
2	3	NaN	Female	75	8.0	85
3	4	19.0	Male	95	NaN	70
4	5	22.0	Male	65	5.0	60

[19]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5 entries, 0 to 4
Data columns (total 6 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   Student ID            5 non-null      int64
 1   Age                   4 non-null      float64
 2   Gender                5 non-null      object
 3   Exam Score            5 non-null      int64
```

```
 4   Study Hours             4 non-null      float64
 5   Attendance Percentage   5 non-null      int64
dtypes: float64(2), int64(3), object(1)
memory usage: 372.0+ bytes
```

[20]:
```
df.describe()
```

[20]:

	Student ID	Age	Exam Score	Study Hours	Attendance Percentage
count	5.000000	4.000000	5.000000	4.000000	5.000000
mean	3.000000	19.750000	82.000000	5.750000	78.000000
std	1.581139	1.707825	12.041595	1.707825	13.509256
min	1.000000	18.000000	65.000000	4.000000	60.000000
25%	2.000000	18.750000	75.000000	4.750000	70.000000
50%	3.000000	19.500000	85.000000	5.500000	80.000000
75%	4.000000	20.500000	90.000000	6.500000	85.000000
max	5.000000	22.000000	95.000000	8.000000	95.000000

[21]:
```
df.isnull()
```

[21]:

	Student ID	Age	Gender	Exam Score	Study Hours	Attendance Percentage
0	False	False	False	False	False	False
1	False	False	False	False	False	False
2	False	True	False	False	False	False
3	False	False	False	False	True	False
4	False	False	False	False	False	False

[22]:
```
df.isnull().sum()
```

[22]:
```
Student ID              0
Age                     1
Gender                  0
Exam Score              0
Study Hours             1
Attendance Percentage   0
dtype: int64
```

[23]:
```
df.notnull()
```

[23]:

	Student ID	Age	Gender	Exam Score	Study Hours	Attendance Percentage
0	True	True	True	True	True	True
1	True	True	True	True	True	True
2	True	False	True	True	True	True
3	True	True	True	True	False	True
4	True	True	True	True	True	True

[24]:
```
df.notnull().sum()
```

[24]:
```
Student ID                5
Age                       4
Gender                    5
Exam Score                5
Study Hours               4
Attendance Percentage     5
dtype: int64
```

[25]:
```
# Inpute missing values with mean
df['Age'].fillna(df['Age'].mean(), inplace=True)
df['Study Hours'].fillna(df['Study Hours'].mean(), inplace=True)
```

[26]:
```
# Now everything is okay
df.isnull().sum()
```

[26]:
```
Student ID                0
Age                       0
Gender                    0
Exam Score                0
Study Hours               0
Attendance Percentage     0
dtype: int64
```

[27]:
```
# Check for inconsistencies
# no of time a value is given in dataset
print(df['Age'].value_counts())
```

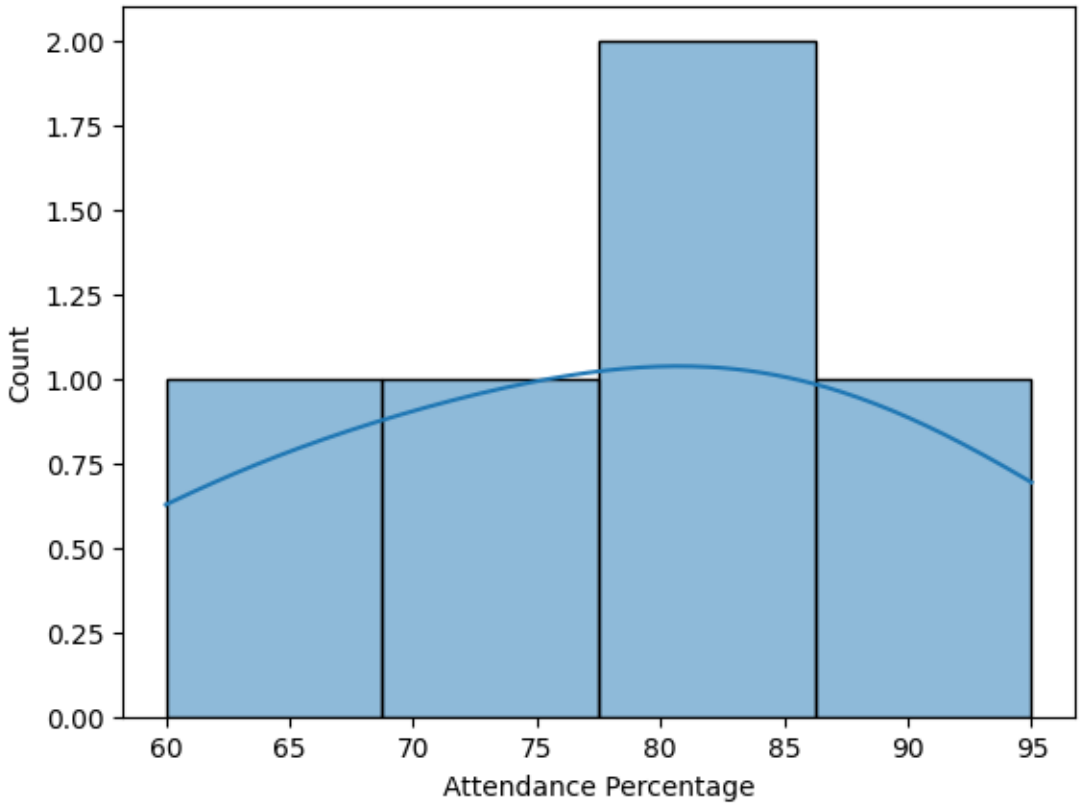
```
Age
18.00    1
20.00    1
19.75    1
19.00    1
22.00    1
Name: count, dtype: int64
```

[28]:
```
# Detect outliers using IQR method
# Handle outliers by replacing with maximum and minimum values
lower_bound = 65
upper_bound = 95
df['Exam Score'] = np.where(df['Exam Score'] < lower_bound, lower_bound,␣
 ↪df['Exam Score'])
df['Exam Score'] = np.where(df['Exam Score'] > upper_bound, upper_bound,␣
 ↪df['Exam Score'])
df['Exam Score']
```

[28]:
```
0    90
1    85
```

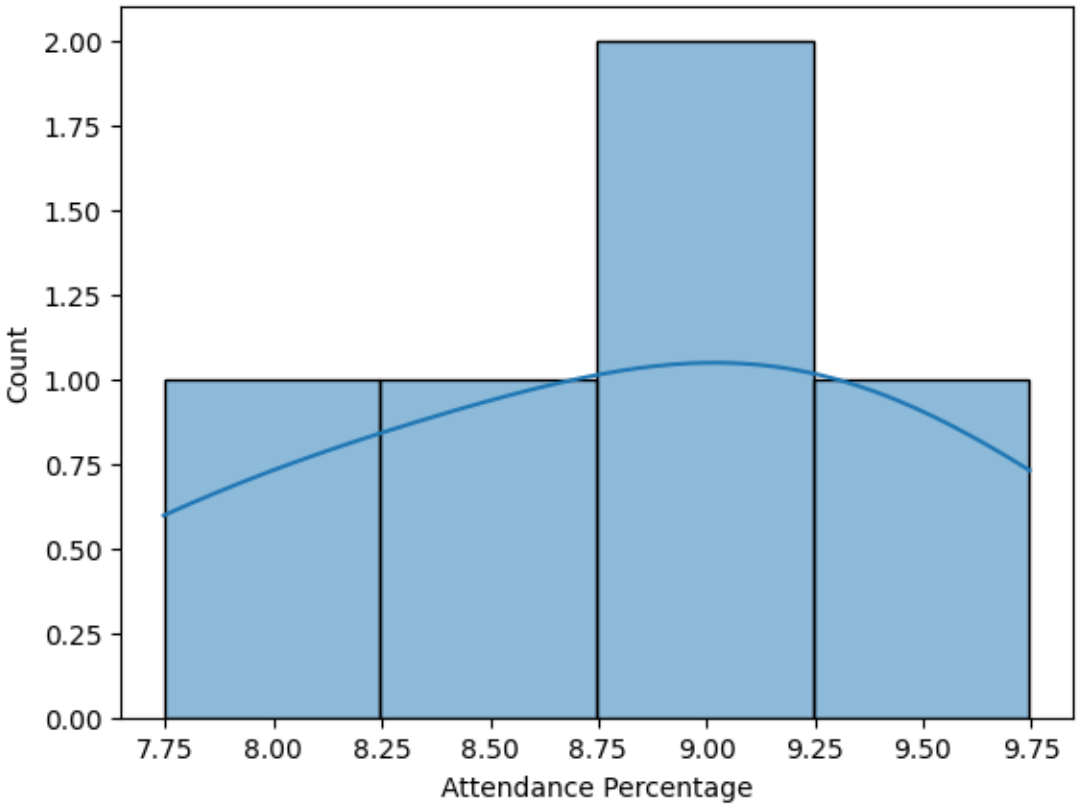
```
2    75
3    95
4    65
Name: Exam Score, dtype: int64
```

[29]:
```
# Check the distribution of 'Attendance Percentage' variable
sns.histplot(df['Attendance Percentage'], kde=True)
plt.show()
```



[30]:
```
# Apply square root transformation
df['Attendance Percentage'] = np.sqrt(df['Attendance Percentage'])

# Check the transformed distribution
sns.histplot(df['Attendance Percentage'], kde=True)
plt.show()
```


2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Count
7.75
8.00
8.25
8.50
8.75
9.00
9.25
9.50
9.75
Attendance Percentage

[ ]:

[ ]:

[ ]: