18-08-2025

Expt No : 4

Experiment to detect outliers in a given dataset

Description : Understand the procedure to identify the outliers in a given dataset.

Soln :

Aim :

To detect and report outliers in a given dataset using Interquartile range IQR method.

Algorithm :

1. Sort the data
2. Compute Q_1, Q_2 and Q_3
3. Compute $IQR = Q_3 - Q_1$
4. Compute lower bound $= Q_1 - 1.5 \times IQR$ and upper bound $= Q_3 + 1.5 \times IQR$
5. Any point < lower bound or > upper bound is an outlier. [lower bound, upper bound] are non-outlier.

Program:

```
import numpy as np
import matplotlib.pyplot as plt
data = np.array([27, 50, 44, 6, 58, 61, 23, 86, 67, 20, 75, 7, 74, 61, 90, 54])
Q1 = np.percentile(data, 25)
Q2 = np.percentile(data, 50)
Q3 = np.percentile(data, 75)
IQR = Q3 - Q1
lower_bound = Q1 - 1.5 * IQR
upper_bound = Q3 + 1.5 * IQR
outliers = data[(data < lower_bound) | (data > upper_bound)]
non_outliers = data[(data >= lower_bound) & (data <= upper_bound)]
print("Data:", data)
print("Q1 =", Q1, "Q2 (median) =", Q2, "Q3 =", Q3)
print("IQR =", IQR)
print("Lower bound (lr) =", lower_bound)
print("Upper bound (ur) =", upper_bound)
print("Outliers detected:", list(outliers))
print("Non-outliers:", list(non_outliers))
```

```
plt.figure()
plt.hist(data, bin=8)
plt.title("Histogram of data")
plt.xlabel("Value")
plt.ylabel("Frequency")
plt.show()

plt.figure()
plt.boxplot(data, vert=False)
plt.title("Boxplot (IQR)")
plt.xlabel("Value")
plt.show()
```

Output:

Q1 = 26.0

Q2 (median) = 56.0

Q3 = 69.0

IQR = 43.0

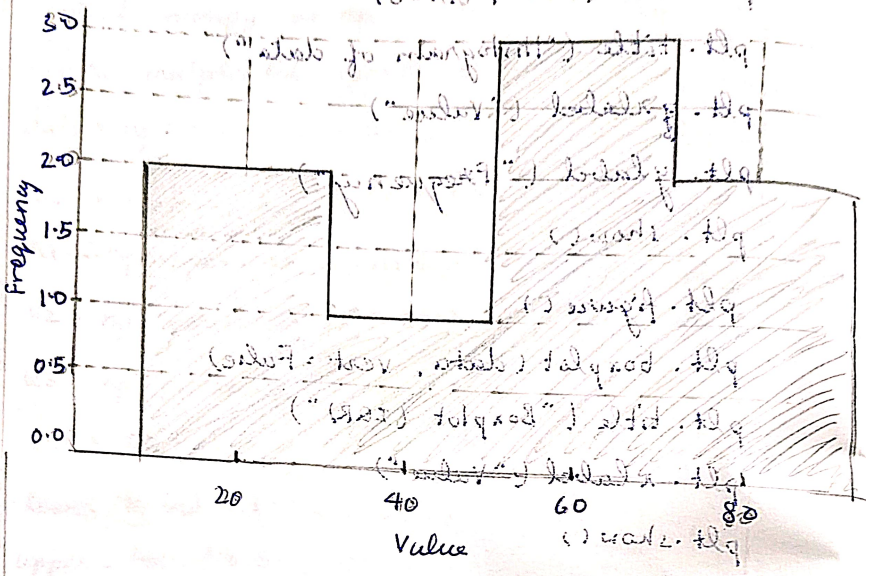
Lower bound (lr) = 38.5

Upper bound (ur) = 133.5

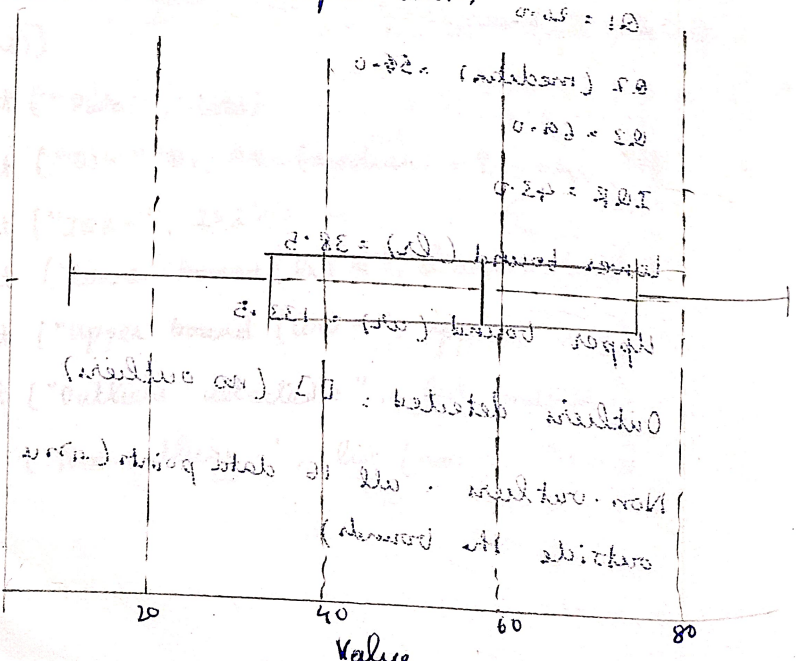
Outliers detected : [] (no outliers)

Non-outliers : all 16 data points (since none fall outside the bounds)

Histogram of Data



Boxplot (IQR)



Result:

Thus, no outliers were found, since all data points lie within the calculated bounds.