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EXPERIMENT - 2

Aim:- To utilize R's visualization capabilities for the graphical representation of measures of dispersion, including Range, Quartile Deviation, Standard Deviation, and Variance, in a given dataset.

Introduction:- Measures of dispersion provide insights into the spread or variability of a dataset. In this practical, we will leverage R's powerful visualization capabilities of graphically represent measures of dispersion, including the range, quartile deviation, standard deviation, and variance. Visualizations enhance our understand of the spread of data and facilitate comparisons between different datasets.

Objective:- The main objectives of this practical are:

1. Calculate measures of dispersion using R functions.
2. Utilize R's visualization tools to graphically represent the range, quartile deviation, and variance.
3. Interpret and analyze the visualizations to gain insights into the spread of the dataset.

Material:-

1. RStudio or R environment installed.

Steps / Procedure:-

Step 1:- Load a dataset or create a vector with the data you want to analyze.

Step 2:- Use R functions to compute the range, quartile

Teacher's Signature:

Aim :- To utilize R's visualization capabilities for the graphical representation of measures of dispersion, including Range, Quartile Deviation, Standard Deviation, and Variance in a given dataset.

Standard Deviation :-

$$\sigma = \sqrt{\frac{\Sigma (x_i - \mu)^2}{N}}$$

Range :-

$$\text{Range}(x) = \text{Max}(x) - \text{Min}(x)$$

```
data <- c(23, 45, 67, 12, 89, 45, 23, 67, 34, 56)
range_value <- diff(range(data))
qdev_value <- IQR(data) / 2
sd_value <- sd(data)
variance_value <- var(data)

# Create a boxplot for the dataset
boxplot(data, main = "Boxplot of the Dataset", col = "lightblue", border = "black")

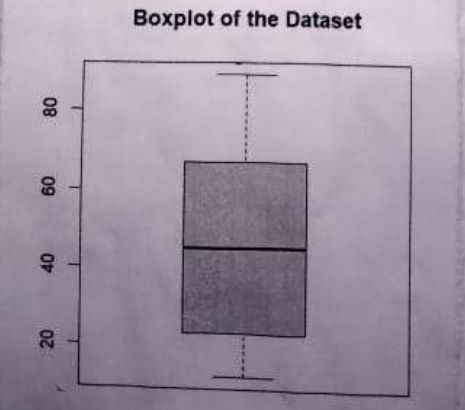
# Add text annotations for each measure of dispersion
text(1, max(data) + 5, paste("Range: ", range_value), col = "red")
text(1, max(data) + 10, paste("Quartile Deviation: ", qdev_value), col = "blue")
text(1, max(data) + 15, paste("Standard Deviation: ", sd_value), col = "green")
text(1, max(data) + 20, paste("Variance: ", variance_value), col = "purple")

# Additional Measures
cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:", range_value, "Var:", variance_value, "Mad:", mad(data), "IQR:
```

values	
data	num [1:10] 23 45 67 12 89 45 23..
qdev_value	19.25
range_value	77
sd_value	24.0159669109255
variance_va..	576.766666666667

Files Plots Packages Help Viewer Presentation

Zoom Export



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deviation, and variance.

Step 3:- Create visualizations to represent the measures of dispersion graphically.

Step 4:- Interpret the visualization and discuss the insights gained from each measure of dispersion. Highlight any pattern or anomalies in the spread of the data.

Step 5:- Explore additional visualizations or analyses based on the characteristics of the dataset. Consider comparing ~~multiple~~ multiple datasets to observe differences in dispersion.

Code :-

```
data ← c(23, 45, 67, 12, 89, 45, 23, 67, 34, 56)
range_value ← diff(range(data))
qdev_value ← IQR(data)/2
sd_value ← sd(data)
variance_value ← var(data)
boxplot(data, main = "Boxplot of the Dataset", col = "lightblue",
border = "black")
text(1, max(data) + 5, paste("Range:", range_value), col = "red")
text(1, max(data) + 10, paste("Quartile Deviation:", qdev_value), col = "blue")
text(1, max(data) + 15, paste("Standard Deviation:", sd_value), col = "green")
text(1, max(data) + 20, paste("Variance:", variance_value), col = "purple")
cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:",
range_value, "Var:", variance_value, "Med:", med(data),
"IQR:", IQR(data), "\n")
```

Teacher's Signature: _____

```
> data <- c(23, 45, 67, 12, 89, 45, 23, 67, 34, 56)
> range_value <- diff(range(data))
> qdev_value <- IQR(data) / 2
> sd_value <- sd(data)
> variance_value <- var(data)
>
> # Create a boxplot for the dataset
> boxplot(data, main = "Boxplot of the Dataset", col = "lightblue", border = "black")
>
> # Add text annotations for each measure of dispersion
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> text(1, max(data) + 15, paste("Standard Deviation: ", sd_value), col = "green")
> text(1, max(data) + 20, paste("Variance: ", variance_value), col = "purple")
>
> # Additional Measures
> cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:", range_value, "Var:", variance_value, "Mad:", mad(data), "IQR:", I
QR(data), "\n")
SD: 24.01597 Min: 12 Max: 89 Range: 77 Var: 576.7667 Mad: 32.6172 IQR: 38.5
>
```

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> cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:", range_value, "Var:", variance_value, "Mad:", mad(data), "IQR:", I
QR(data), "\n")
SD: 24.01597 Min: 12 Max: 89 Range: 77 Var: 576.7667 Mad: 32.6172 IQR: 38.5
>
```

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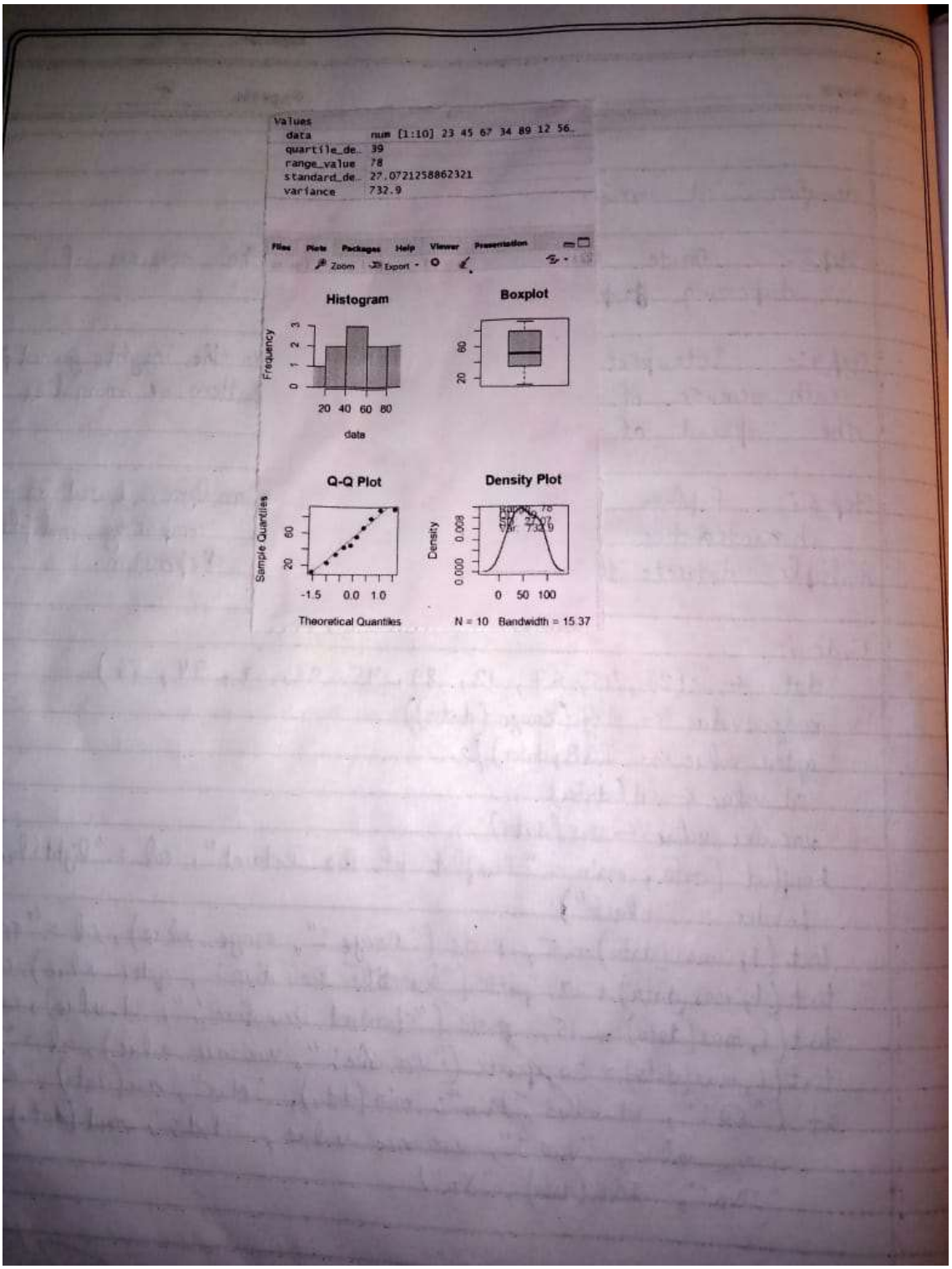
Conclusion :- Summarize the key findings from visualizing measures of dispersion and emphasize the importance of understanding the spread of data in statistical analysis. This practical exercise in using R for both calculation & graphical representation of measures of dispersion.



SCREENSHOTS:

```r
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variance_value <- var(data)

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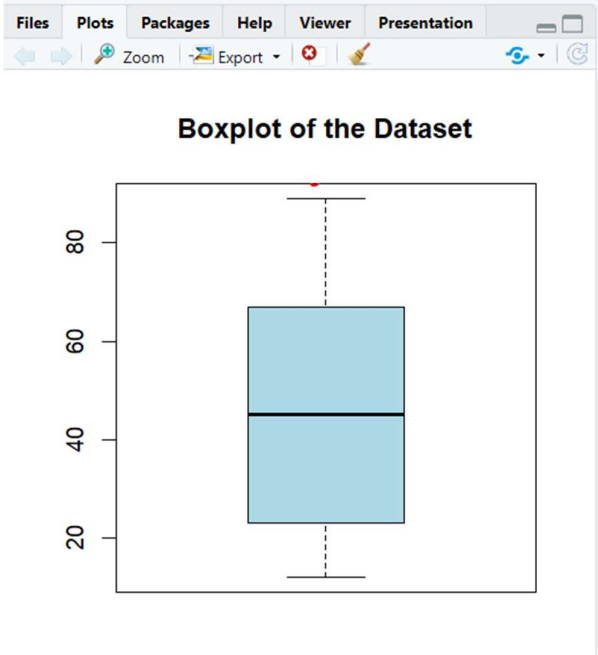
text(1, max(data) + 20, paste("Variance: ", variance_value), col = "purple")

# Additional Measures
cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:", range_value, "Var:", variance_value, "Mad:", mad(data), "IQR:
```

Values

data	num [1:10] 23 45 67 12 89 45 23…
qdev_value	19.25
range_value	77
sd_value	24.0159669109255
variance_va…	576.766666666667



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>
> # Additional Measures
> cat("SD:", sd_value, "Min:", min(data), "Max:", max(data), "Range:", range_value, "Var:", variance_value, "Mad:", mad(data), "IQR:", I
QR(data), "\n")
SD: 24.01597 Min: 12 Max: 89 Range: 77 Var: 576.7667 Mad: 32.6172 IQR: 38.5
>
```

Values

data	num [1:10] 23 45 67 34 89 12 56…
quartile_de…	39
range_value	78
standard_de…	27.0721258862321
variance	732.9