Exploring Data With R

Abhishek Kumar
ItsAbhishekKumar.com
@MeAbhishekKumar

pluralsight
hardcore dev and IT training

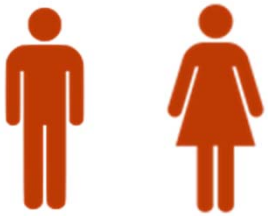
Outline

Overall structure | Continuous data | Categorical data

Types of Data

Categorical data

Colors

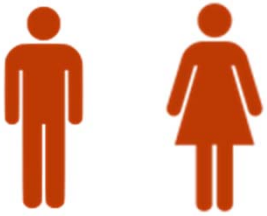


Gender

Use factor

Continuous data

Mileage



Height, Weight, Age

Use numeric / integer

Overall Structure

Number of observations | Number of features | Data types | Sample data

Dataset

Iris dataset

50 samples

Iris-setosa

50 samples

Iris-virginca

50 samples

Iris-versicolor

Features : sepal length, sepal width, petal length, petal width

Available in datasets package

Images: http://en.wikipedia.org/wiki/Iris_flower_data_set

Analysis of Continuous Data

Central tendency

Spread or dispersion

Central Tendency

Mean (Average)

Set A

$$\text{Mean} = \frac{\text{Sum of all values}}{\text{Number of values}}$$

Mean = **75**

Central Tendency

Median

Set A

{ 60, 60, 70, 75, 80, 80, 85, 90 }

Median = **77.5**

Central Tendency

Why Not Sufficient?

Set A

Mean = **75**

Median = **77.5**

Set B

Mean = **75**

Median = **77.5**

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Spread

Range

Set A

Range = **maximum - minimum**

Range = **90 – 60 = 30**

Spread

Range

Set A

Mean = **75**

Median = **77.5**

Range = **90 – 60 = 30**

Set B

Mean = **75**

Median = **77.5**

Range = **100 – 25 = 75**

Spread

Quartiles

Set A

{ 60, 60, 70, 75, 80, 80, 85, 90 }

Median (Q2) = **77.5**

{ 60, 60, 70, 75}

Median (Q1) = **65**

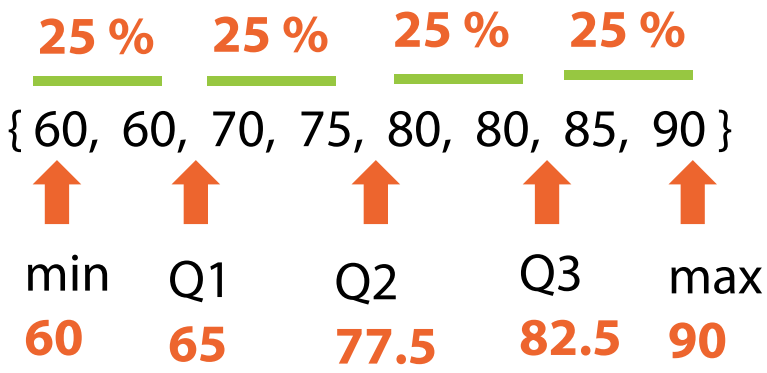
{80, 80, 85, 90 }

Median (Q3) = **82.5**

Spread

Quartiles

Set A



Five point summary **(min, Q1, Q2, Q3, max)**

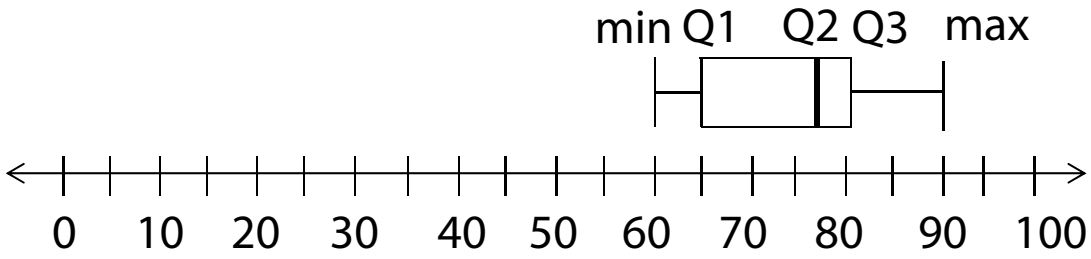
Spread

Box Plot (Box – Whisker Plot)

Set A

{ 60, 60, 70, 75, 80, 80, 85, 90 }

min	Q1	Q2	Q3	max
60	65	77.5	82.5	90



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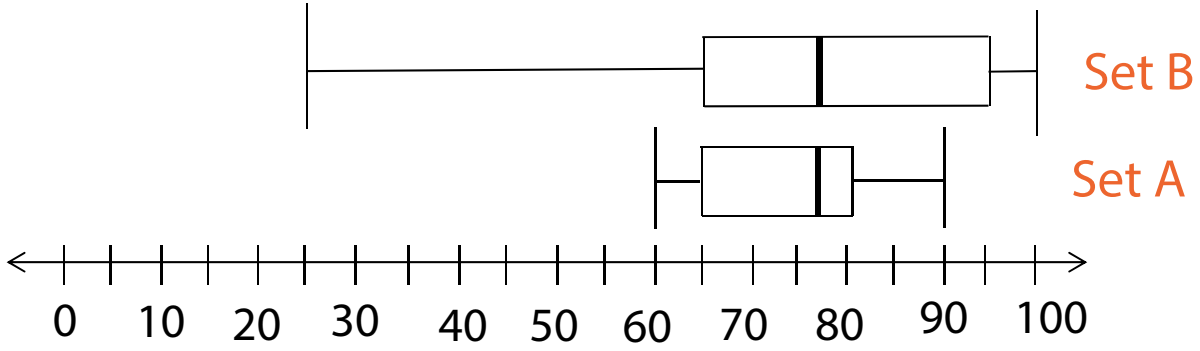
Box Plot

Set A

min	Q1	Q2	Q3	max
60	65	77.5	82.5	90

Set B

min	Q1	Q2	Q3	max
25	65	77.5	95	100



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Box Plot

→ Outliers (higher than 1.5 times Q3)

→ Minimum : Highest value (excluding outliers)

→ Q3 : Quartile 3 (upper quartile)

→ Q2 : Quartile 2 (median)

→ Q1 : Quartile 1 (lower quartile)

→ Minimum : least value (excluding outliers)

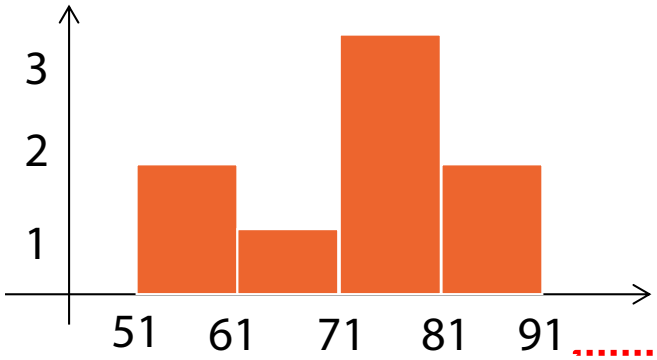
→ Outliers (less than 1.5 times Q1)

Spread

Histogram

Set A

Range	Count
51-61	2
61-71	1
71-81	3
81-91	2



Histogram

Spread

Variance & Standard deviation

Set A

{ 60, 80, 70, 75, 80, 85, 60, 90} Mean = **75**

{ -15, 5 , -5 , 0 , 5 , 10 , -15, 15}

{ 225 , 25 , 25 , 0 , 25 , 100 , 225, 225}

850

850 / 8 = 106.25

Variance = **106.25**

Sqrt(106.25) = ~10.30

Std. dev = **~ 10.30**

Spread

Variance & Standard Deviation

Mean = **75**

Median = **77.5**

Std. deviation = **~10.3**

Variance = **106.25**

Set A

Mean = **75**

Median = **77.5**

Std. deviation = **~ 20.9**

Variance = **437.5**

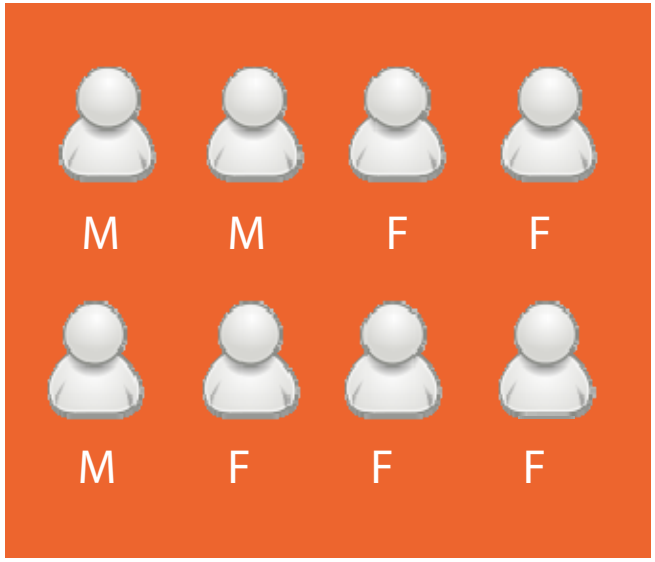
Set B

Analysis of Categorical Data

Frequency distribution

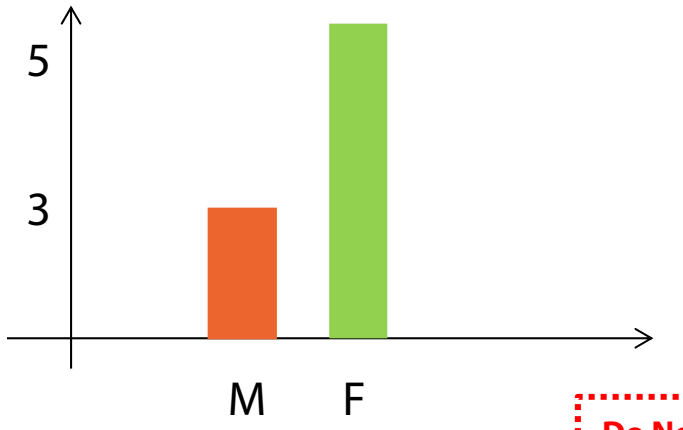
Category statistics

Frequency Distribution



Set A

Category	Count	Proportion
Male	3	3/8 = 0.375
Female	5	5/8 = 0.625



Bar plot

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Category Statistics

Set A

Category	Values	Mean
Male	{ 60, 80, 80)	~ 73.3
Female	{ 70, 75, 85, 60, 90 }	76

Summary