

# Descriptive Statistics

## Data Types

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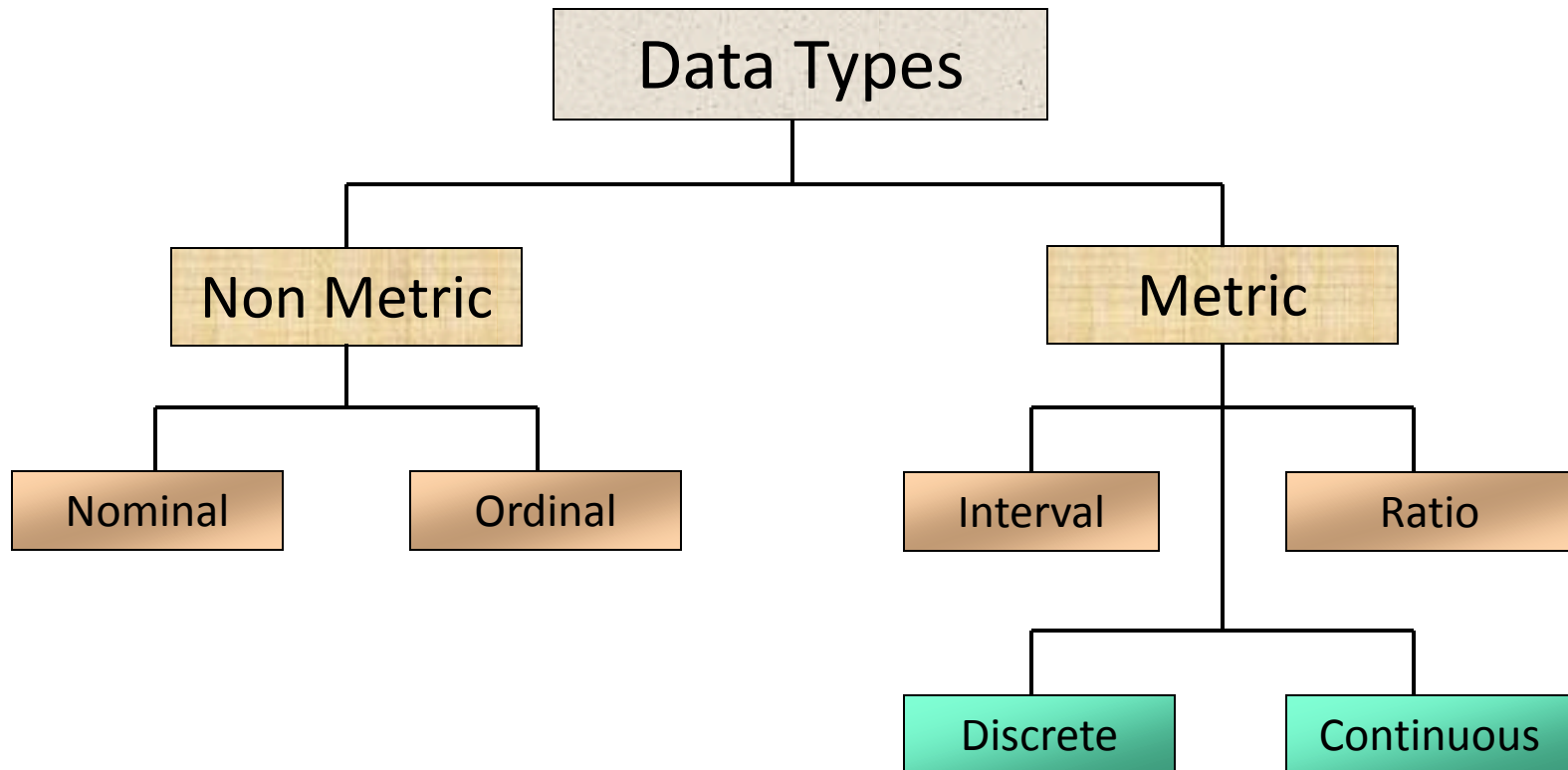
# Outline

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- □ Types of Variables
  - Classification: 'NOIR'
    - Nominal
    - Ordinal
    - Interval
    - Ratio
  - Classification: Discrete/Continuous
    - Discrete
    - Continuous

# Data Types

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# Non Metric Variables

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- ❑ Non Metric Variables place data into distinct categories according to some defining characteristic.
- ❑ Mathematical operation cannot be defined.
- ❑ Categories may be numerical in appearance but cannot have any mathematical sense like PIN Codes.

## Examples:

- ❑ City Names: Lucknow, Delhi, NewYork
- ❑ Movie Ratings: 3 Star, 2 Star, 5 Star
- ❑ Pin Codes: 110003, 226016, 122002
- ❑ Colors: Red, Blue, Green



# Metric Variables

- Numerical in nature, result from a process that counts or measures.
- Some of the mathematical operations can be defined on the variables.
- Exam Scores can be subtracted/ divided, hence Metric.

## Examples:

- Year of birth : 1564, 1642, 1879
- Monthly Salary: \$ 500,000, Rs 2000
- Temperature: -460 F, 32 F, 212 F
- Area of Playground: 736.2 m<sup>2</sup>, 9 Π yard<sup>2</sup>



# Outline

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- Types of Variables

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# Nominal Variables

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- ❑ Nominal Variables are data that record categories.
- ❑ Classifies data into mutually exclusive, exhaustive categories in which no order can be imposed.
- ❑ Color of your dress can be classified into different groups but it can't be said that 'red' is greater/ smaller than 'blue'.

## Examples:

- ❑ Colors: Red, Blue, Green
- ❑ City Names: Lucknow, Delhi, NewYork
- ❑ Movie Types: Comedy, Romantic, Action
- ❑ Pin Codes: 110003, 226016, 122002

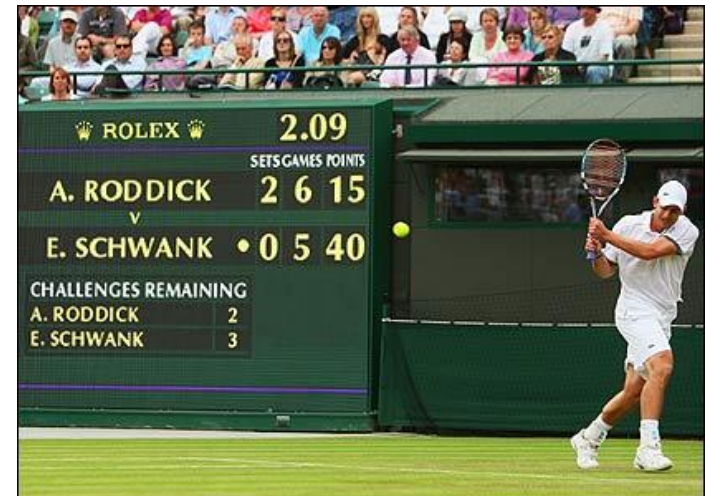


# Ordinal Variables

- ❑ Ordinal Variables classify data into categories that can be ranked.
- ❑ Subtraction Operation does not make any sense.
- ❑ In a Tennis game, difference between 40,30 and 30,15 are same in terms of tennis effort but not mathematically.

## Examples:

- ❑ Tennis Scores in a 'Game': 0, 15, 30, 40
- ❑ Movie Ratings: 2 Star, 3 Star, 5 Star
- ❑ Height Type: Small, Medium, Large
- ❑ Cancer: Stage 1, Stage 2, Stage 3



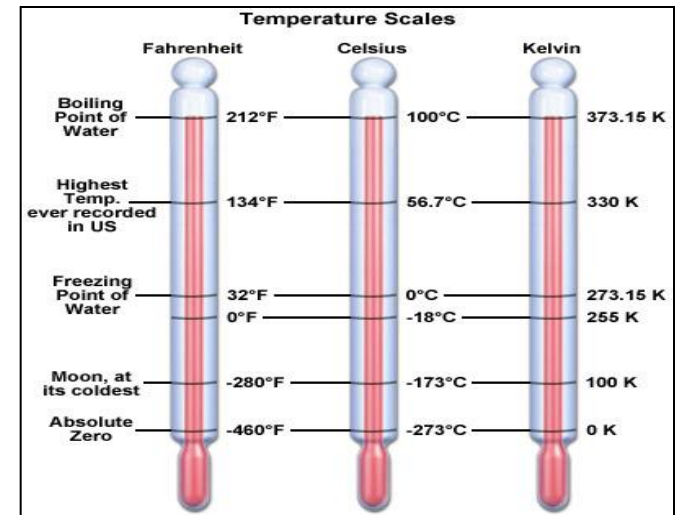


# Interval Variables

- Interval scale tells about the order of data points, and the size of the intervals in between data points.
- Addition/Subtraction can be defined on this data.  $8\text{C}-4\text{C}$  and  $38\text{C}-36\text{C}$  correspond to same increase in temperature.
- 0 does not correspond to the 'actual' zero.  $0\text{C}$  is not the lowest possible temperature.

## Examples:

- Temperature: -460 F, 32 F, 212 F
- Temperature: -273 C, 0 C, 100 C
- Year of birth : 1564, 1642, 1879
- Tennis Scores for a 'Set': 0, 1, 2, 3, 4, 5, 6



# Ratio Variables

- Ratio scale is an interval scale with a true zero point.
- 0 corresponds to the 'attribute' being totally absent.
- Ratio (Division) can be defined on this data.
- Person with \$4.2 million is 2.1 times 'richer' than a person with \$2 million.

## Examples:

- Monthly Salary: \$ 50,000, Rs2000, £4302
- Temperature in Kelvin: 0 K , 273 K, 373 K
- Area of Playground: 736.2 m<sup>2</sup>, 9 Π yard<sup>2</sup>
- Weight: 0 kg, 50 kgs, 90 kgs



# NOIR: Summary

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<b>Valid Computation</b>	<b>Nominal</b>	<b>Ordinal</b>	<b>Interval</b>	<b>Ratio</b>
<b>Frequency, Mode</b>	Yes	Yes	Yes	Yes
<b>Median, Percentiles</b>	No	Yes	Yes	Yes
<b>Addition, Mean, Variance</b>	No	No	Yes	Yes
<b>Multiplication, Ratio</b>	No	No	No	Yes

# Outline

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- Types of Variables
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- Ratio

- □ Classification: Discrete/Continuous

- Discrete
- Continuous

# Discrete Variables


- Discrete Variables can take countable (possibly infinite) number of values. 
- Between any two points, Discrete variables can have only finite number of values.
- Number of stars in sky are infinite but can be counted.

## Examples:

- Visible Stars : 1, 7, 1 trillion
- Exam Scores: 24, 52.5, 80.5
- Year of birth : 1564, 1642, 1879
- Grade Point Average: 5.39, 7.49, 9, 9.333



# Continuous Variable

- Continuous Variables can take uncountable (definitely infinite ) number of values. 
- Between any two points, Continuous Variables would have infinite number of values.
- Number of time instants between two times is infinite.

## Examples:

- Time: 09:10:34.6, 23:59:23.34322
- Temperature in Kelvin: 0 K , 273.2 K, 373 K
- Area of Playground: 736.23 m<sup>2</sup> , 9 Π yard<sup>2</sup>
- Weight: 0 kg, 50.23 kgs, 90 kgs

