Exploring Data through Summary Statistics

After this video you will be able to..

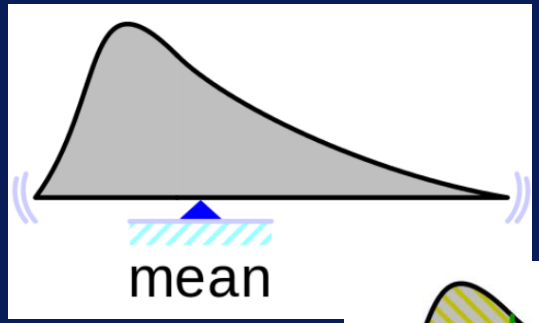
- Define what a summary statistic is
- List three common summary statistics
- Explain how summary statistics are useful in exploring data

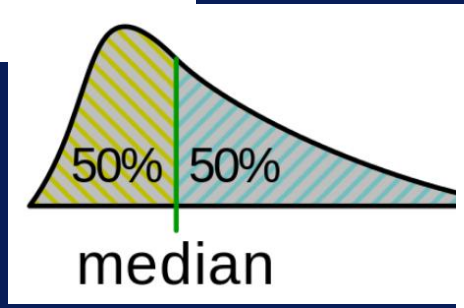
What are summary statistics?

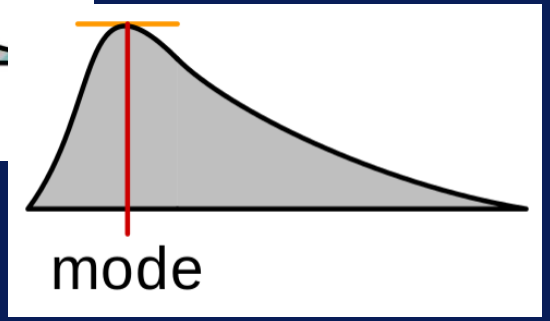
- **Quantities that summarize and describe a set of data values**
- **Measures of**
  - Location: mean, median
  - Spread: standard deviation
  - Shape: skewness

Measures of Location

Describe central or typical value of dataset







Measures of Location - Example

Age
35
42
78
22
56
50
42
78
21
87

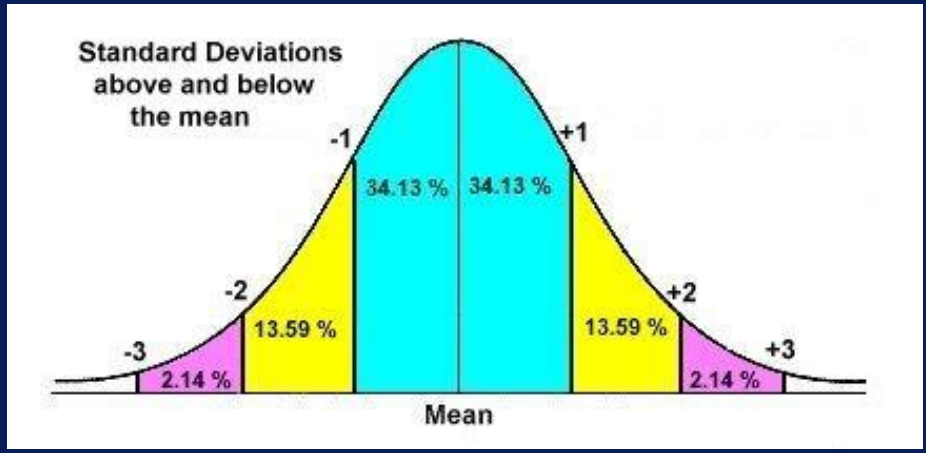
Age (sorted)
21
22
35
42
42
50
56
78
78
87

Mean = 51.1

Median = (42+50)/2 = 46

Mode = 42 & 78

Measures of Spread



Describe how dispersed or varied data is

minimum

maximum

standard deviation

variation

range

Measures of Spread – Example

Age
35
42
78
22
56
50
42
78
21
87

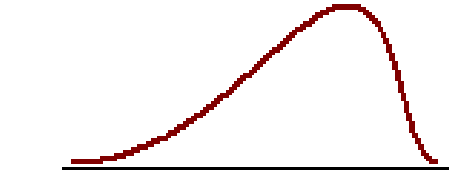
Age (sorted)
21
22
35
42
42
50
56
78
78
87

Range = 87 – 21 = 66

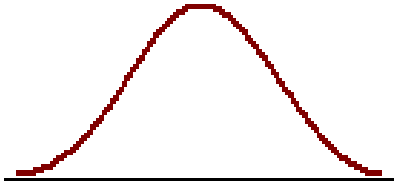
Variance = 548.767

Standard deviation = 23.426

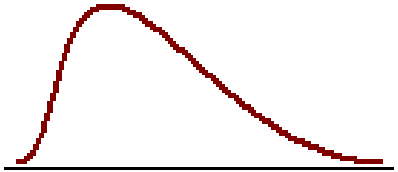
Measures of Shape



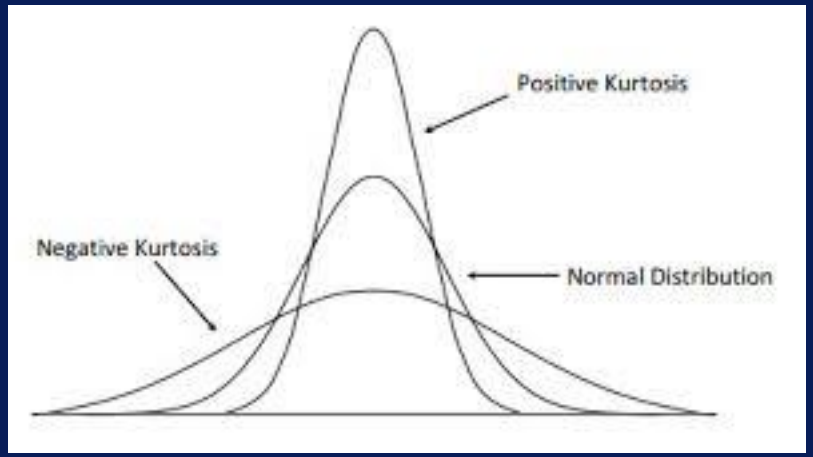
Negatively skewed distribution
or Skewed to the left
Skewness <0



Normal distribution
Symmetrical
Skewness = 0



Positively skewed distribution
or Skewed to the right
Skewness > 0



skewness

kurtosis

Measures of Shape – Example

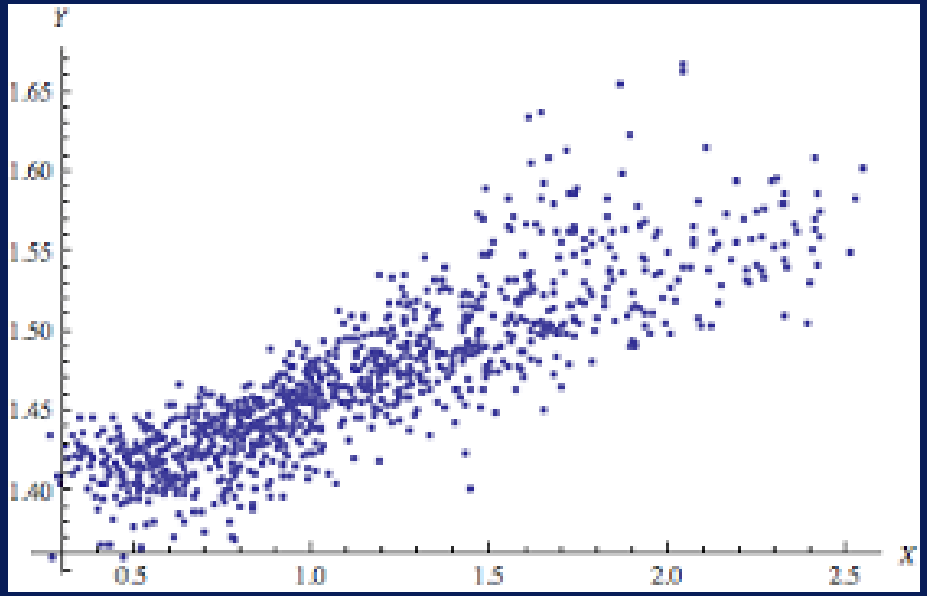
Age
35
42
78
22
56
50
42
78
21
87

Skewness = 0.2995

Kurtosis = -1.2028

Measures of Dependence

Describe relationship between variables



correlation

Measures of Dependence – Example

Height	Weight
180	68
153	70
204	84
133	44
208	81
142	53
122	40
168	50
175	64
200	72

Correlation = 0.8906

Statistics on Categorical Variables

Describe number of categories and frequency of each category

Color/Pet	White	Brown	Black	Orange	Total
Dog	34	44	32	0	110
Cat	25	2	43	0	70
Fish	1	0	5	33	39
Total	60	46	80	33	219

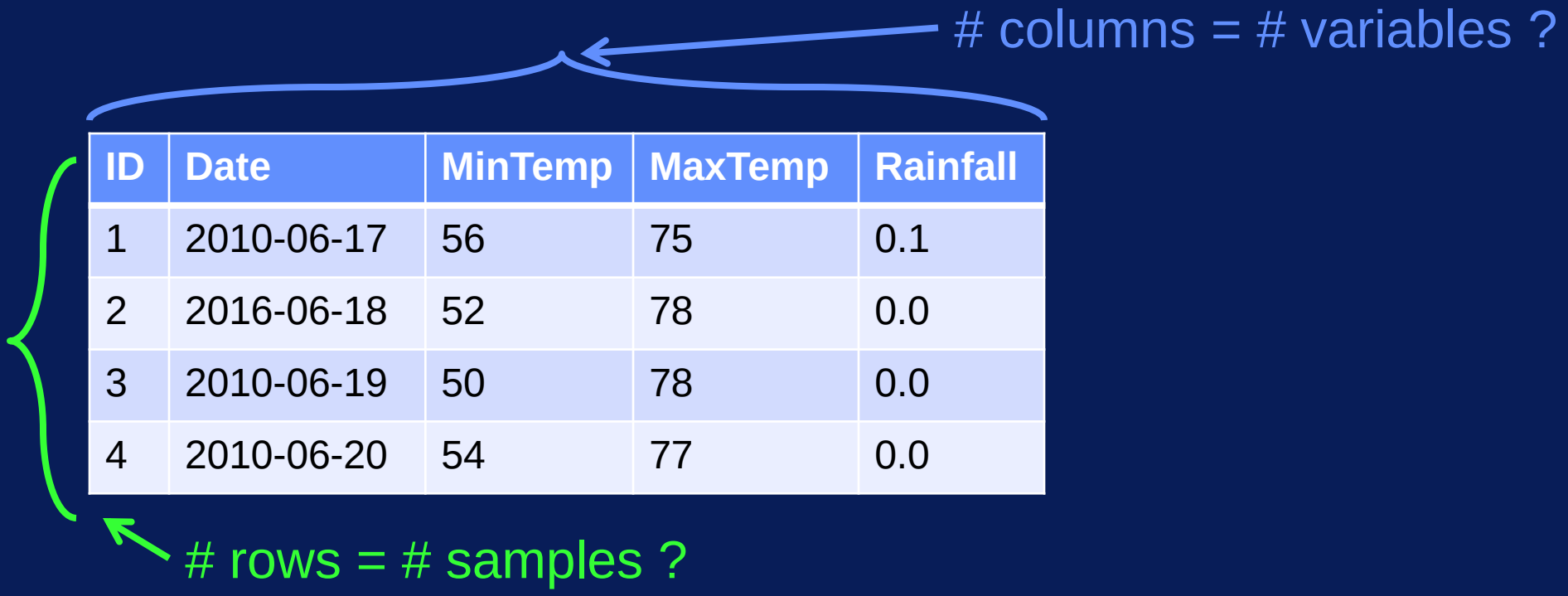
contingency table

Contingency Table - Example

Color/Pet	White	Brown	Black	Orange	Total
Dog	34	44	32	0	110
Cat	25	2	43	0	70
Fish	1	0	5	33	39
Total	60	46	80	33	219

Check Dimensions

- **Check number of rows and columns**



ID	Date	MinTemp	MaxTemp	Rainfall
1	2010-06-17	56	75	0.1
2	2016-06-18	52	78	0.0
3	2010-06-19	50	78	0.0
4	2010-06-20	54	77	0.0

Check Values

- **Check values in some samples**

Should temperature values in F or C?

Is this correct?

ID	Date	MinTemp	MaxTemp	Rainfall
1	2010-06-17	56	24	0.1
2	2016-06-18	52	26	3,678.9
3	2010-06-19	50	26	0.0
4	2010-06-20	54	25	0.0

Is this date or timestamp?

Check Missing Values

ID	Date	MinTemp	MaxTemp	Rainfall
1	2010-06-17	56	75	--
2	2016-06-18	52	78	--
3	2010-06-19	--	78	0.1
4	2010-06-20	54	77	--

Does feature have mostly missing values?

How many samples have missing values?

Summary Statistics

- **Measures of**
  - Location, spread, shape, dependence
- **Contingency table**
  - For categorical variables
- **Data validation**
  - Dimensions, missing values