October 31, 2021

Measures of Central Tendency & Variation

Measures of Central Tendency — find the "center" of the data

$$\text{Mean} = \frac{\sum x}{n}$$

$\bar{x}$ = sample mean

μ = population mean

x = data

n = # of items

$\sum$ = sum

↑ most affected by extreme values

Median = the middle value

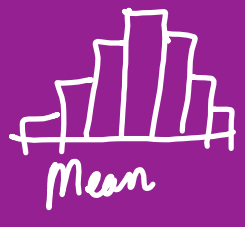
Data must be in order!

75 pieces of data $\frac{75}{2} = 37.5 \simeq 38^{th}$

120 pieces of data $\frac{120}{2} = 60^{th} + 61^{st}$

Mode — the most frequent value

Histogram

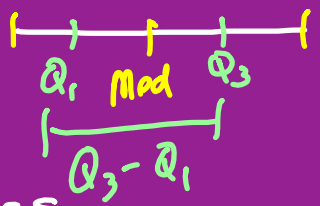


MEASURES OF VARIATION – Show the "spread" of the data

Range = Highest value − Lowest value most affected by extreme values

Interquartile Range (IQR) = $Q_3 - Q_1$

Range of middle 50% of data



Standard Deviation – sample st. dev = s
population st. dev = σ

the "average" of how much each piece of data varies from the mean.

{7, 13, 16, 17, 19, 24}

1) Mean = $\frac{96}{6} = 16$

2) Data − Mean

$7-16 \quad 13-16$

$(-9)^2 + (-3)^2 + (0)^2 + (1)^2 + (3)^2 + (8)^2 = \frac{164}{6} = \sqrt{27.33} \approx 5.23$

$$\sigma = \sqrt{\frac{\sum (x-\mu)^2}{n}} \qquad s = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}$$

4	2
5	8
6	1 1 8 (9)
7	2 4 4 5 6 | 8 9
8	2 2 2 (6) 8
9	1 4 8 9

4|2 = 42%

22 students

Outlier = 42

Median = $\frac{22}{2} = 11^{th} \& 12^{th}$

$= \frac{76+78}{2} = 77$

Quartiles = $\frac{11}{2} = 5.5 \simeq 6^{th}$

$Q_1 = 69$ $Q_3 = 86$

IQR = 86 − 69 = 17

Outliers

1) IQR * 1.5 = #

17 * 1.5 = 25.5

2) Lower boundary: Q_1 − #

69 − 25.5 = 43.5

3) Upper boundary: Q_3 + #

86 + 25.5 = 111.5