SOC 4015/5050: Lecture 03 Equations

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Median (odd n of items)

Let m = the median item's term:

$$m = \left(\frac{n+1}{2} \right)^{th} \tag{1}$$

Median (even n of items)

Let m_a = the median item's term:

$$m_a = \left(\frac{n+1}{2} \right)^{th} \tag{2a}$$

Let x_a = the next lower value before m_a. Let x_b = the next higher value after m_a.

Let m_b = the median:

$$m_b = \left(\frac{x_a+x_b}{2} \right) \tag{2b}$$

Mean

$$\bar{x} = \frac{\sum_{i=1}^{n} x}{n} \tag{3}$$

Standard Deviation

Deviance

$$D = \left(x - \bar{x}\right) \tag{4a}$$

Total Error

$$TE = \sum_{i=1}^{n} \left(x - \bar{x}\right) \tag{4b}$$

Sum of Squared Error

$$SS = \sum_{i=1}^{n} \left(x - \bar{x}\right)^2 \tag{4c}$$

Variance

$$s^2 = \frac{\sum_{i=1}^{n} \left(x - \bar{x}\right)^2}{n-1} \tag{4d}$$

Standard Deviation

$$s = \sqrt{\frac{\sum_{i=1}^{n} \left(x - \bar{x}\right)^2}{n-1}} \tag{4e}$$

Formatting Work by Hand

Given $x = [1, 7, 3, 2, 8, 6, 3, 8, 7]$

$$s^2 = \frac{\sum_{i=1}^{n} (x - \bar{x})^2}{n - 1}$$

$$s^2 = \frac{60}{8}$$

$$s^2 = 7.5$$

$$s = \sqrt{s^2}$$

$$s = \sqrt{7.5}$$

$$s = 2.739$$

i	x	$\overline{x}$	D	D^2
1	1	5	-4	16
2	7	5	2	4
3	3	5	-2	4
4	2	5	-3	9
5	8	5	3	9
6	6	5	1	1
7	3	5	-2	4
8	8	5	3	9
9	7	5	2	4
Σ			**0**	**60**