Frequency distribution

Notebook:	INIAD Statistics		
Created:	10/17/2018 10:15 PM	**Updated:**	10/18/2018 9:38 PM
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- Definition
    - Mean:
        - Calculate: Average
        - $x = \{1, 2, 3, 4, 5\}; \bar{x} = 3$
    - Median:
        - Value of middle element
    - Range
        - Max - Min
- Average Deviation

    - Average deviation : The mean of the distance between each sample and the sample mean.
        - $d = \dfrac{1}{n}\{\ |x_1 - \bar{x}| + |x_2 - \bar{x}| + \cdots + |x_n - \bar{x}|\ \}$
        - $d_A = 1.8,\ d_B = 2.8,\ d_C = 0.8$
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- Variance and Standard Deviation

    ## Variance and standard deviation (SD)

    - Variance: Mean of the squared distance between each sample and the sample mean.

    $$s^2 = \frac{1}{n}\left\{ (x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \ldots + (x_n - \bar{x})^2 \right\}.$$

    - Standard deviation (SD) : Square root of variance. It has the same unit as the sample.

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

    $$S_A = 2.569,\ S_B = 3.286,\ S_C = 1.095$$

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- Calculate total SD of two set A and B

$$S^2 = \frac{n_A\{S_A^2 + (\bar{x} - \bar{x}_A)^2\} + n_B\{S_B^2 + (\bar{x} - \bar{x}_B)^2\}}{n}.$$

$$S = \sqrt{\frac{n_A\{S_A^2 + (\bar{x} - \bar{x}_A)^2\} + n_B\{S_B^2 + (\bar{x} - \bar{x}_B)^2\}}{n}}.$$

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Standard score and T-score

- Standard score (z-score): data obtained by a transform that makes the mean and standard deviation 0 and 1, resp.

  - Subtract the mean from each sample, and then divide it by the standard deviation. Each sample x_i after this transform is denoted as z_i (i=12,...,n).

$$z_i = \frac{x_i - \bar{x}}{S_x}$$

- T-score: data obtained by making the mean and standard deviation 50 and 10, reps.

- $T_i = z_i \times 10 + 50$

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