Medical Data Analysis in Excel
Part I

CIS 1902103: Computer Skills for Medical Students

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Central Tendency Measurements

Central Tendency: mean, median, and mode

- The **mean** is the average of data values

$$mean = \frac{\sum x_n}{n} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

- **Example:**

The mean for 5 values: $4, 36, 45, 50, 75$ is

$$\frac{4+36+45+50+75}{5} = \frac{210}{5} = 42$$

- **In Excel:**

    = average(range of cells)

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Central Tendency Measurements

● The **median** is the middle value of the data after sorting.

● If n **is odd** then Median $= x\left(\frac{n+1}{2}\right)$

● If n **is even** then Median $= \dfrac{x\left(\frac{n}{2}\right) + x\left(\frac{n}{2} + 1\right)}{2}$

● **Example :**

The median for **4, 9, 6, 12, 16** $= 9$

The median for **4, 9, 6, 12, 19, 16** $= 10.5$

● **In Excel :**

=median(range of cells)

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Central Tendency Measurements

● The **mode** is the most frequently occurring

● **Example:**

The mode for **2, 2, 9, 6, 12, 8** $= 2$

The mode for **2, 2, 4, 6, 7, 8, 4** $= 2$ and **4**

The mode for **2, 6, 9, 16, 12, 8, -2, 0.4** $=$ Not available (no mode)

● **In Excel:**

=mode (range of cells)

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Dispersion Measurements

Dispersion: Range, variance, and standard deviation

- **Range** : Max – Min
- **Example:**

The range for *2, 6, 8, 9, 12* = *12-2=10*

- **In Excel:**

    =max(range of cells) - min(range of cells)

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Dispersion Measurements

- The **variance** is given by: $\text{variance} = \dfrac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$
- **Example:**

The variance for 5, 6, 2, 8, 9 = 7.5

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{5} x_i = \frac{2+5+6+8+9}{5} = 6$$

x	2	5	6	8	9	Total sum
$(x_i - \bar{x})$	-4	-1	0	2	3	0 = sum of residuals
$(x_i - \bar{x})^2$	16	1	0	4	9	30

$$\frac{30}{4} = 7.5$$

- **In Excel:**

    =var(range of cells)

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Dispersion Measurements

- The **Standard deviation** is given by:

- standard deviation $= \sqrt{\dfrac{\sum(x_i - \bar{x})^2}{n-1}}$

- **Example**:
The standard deviation for 5, 6, 2, 8, 9 $= \sqrt{7.5} = 2.73861$

- **In Excel:**
  - =stdev(range of cells)

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