Measures of Central location

DOH-NEC

FREQUENCY DISTRIBUTION

Normal Curve

Central Location

Dispersion

Negatively skewed

Positively skewed
Measures of Central Location

- **Mean** - average of a set of data
- **Median** - middle of a set of data
- **Mode** - most often in a set of data

**Mean**

\[
\bar{X} = \frac{\sum x_i}{n}
\]

**How to get the mean:**

1. Sum the individual observations
2. Count the number of observations
3. Divide the sum of the observations by the count of the observations
**Median**

How to get the median:

1. Arrange the observations in order.
2. Find the middle rank: Count the number of observations (n), then add 1 and divide the sum by 2.
3. Identify the median: if "n" is odd, the median is the value where the middle rank falls, if "n" is even, the median is equal to the average of the two values where middle rank falls in between.

\[ \text{Middle Rank} = \frac{n+1}{2} \]

**Mode**

How to get the mode:

1. Arrange the observations in order.
2. Find the value of the observations that occurs most often in a set of data.
3. There can be no mode, one mode, or more than one mode.
Let’s try . . .

Below is a line listing of 3 variables for 9 persons.

<table>
<thead>
<tr>
<th>Person #</th>
<th>Variable A</th>
<th>Variable B</th>
<th>Variable C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>7</td>
<td>3</td>
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<tr>
<td>6</td>
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<tr>
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<td>9</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Choosing the Measures of Central Location and Dispersion

<table>
<thead>
<tr>
<th>Type of Distribution</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central Location</td>
<td>Dispersion</td>
</tr>
<tr>
<td>Normal</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Skewed</td>
<td>Median</td>
<td>Range</td>
</tr>
</tbody>
</table>
Measure of Dispersion

- A measure of dispersion describes the spread of the distribution
  - Range
  - Standard deviation

RANGE

- The range is the difference between the largest and smallest value of a set of data
  
  **formula:**

  \[
  \text{Range} = \text{maximum value} - \text{minimum value}
  \]
STANDARD DEVIATION

- The standard deviation is the square root of the average squares of the deviations about the mean (variance)

formula:

$$SD = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

Thank you