

Statistical Data Analysis

EKA: T510028102

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Learning objectives

- Knowledge
 - explain relevant data types and their representation for statistical analysis
 - explain probabilities and random variables
 - explain distributions of random variables
 - explain inference and hypothesis testing
 - explain how data may be collected from experiments involving randomness
- Skills
 - choose an appropriate experimental design in respect to a given task
 - perform statistical analyzes on data collected
 - use a statistical tool for analysis and visualization of data
- Competence
 - use statistical methods and tools to interpret experimental data

1 Exercises lecture 1

1) The table below shows the height of students in class A (total of 15 students) and class B (total of 16 students), measured in centimeters. For each of the classroom, calculate the following:

1. Median
2. Mean
3. Mode
4. Midrange

Class a	Class b
156	185
175	175
189	169
165	182
160	179
154	163
158	191
170	182
171	180
169	174
180	161
175	180
172	176
169	174
162	182
	173

Answer

Median To get the median we sort the data in ascending order and then selecting the middle one:

$$\text{Sort}(\text{class}_a) = [154, 156, 158, 160, 162, 165, 169, 169, 170, 171, 172, 175, 175, 180, 189]$$
$$\text{Middle value} = 169$$

Since class b has 16 students we get the median by selecting the two middle value and then dividing them by 2:

$$\text{Sort}(\text{class}_b) = [161, 163, 169, 173, 174, 174, 175, 176, 179, 180, 180, 182, 182, 182, 185, 191]$$
$$\text{Middle values} = [179, 180]$$

$$\text{Median} = \frac{179 + 180}{2} = 179.5$$

mean

To get the mean we first sum all the values and then divide by:

$$\begin{aligned} Class_a &= [x_1, x_2, ..x_{15}] \\ \sum Class_a &= \sum x_1, ..., x_{15} = 2525 \\ \frac{2525}{15} &= 168.33 \end{aligned}$$

We now do the same for class b:

$$\begin{aligned} \sum class_b &= 2826 \\ \frac{2826}{16} &= 176.625 \end{aligned}$$

Mode To calculate the mode we count the instances of data values and pick the most common (most instances):

$$\text{count instances class a} = [(169, 2), (175, 2)]$$

So class a is bimodal.

Now we calculate class b:

$$\text{count instances class a} = (182, 3)$$

Midrange To calculate the midrange we add the lowest and the highest value together and divide by two:

$$Midrange(class_a) = \frac{154 + 180}{2} = 171.5 \quad (1)$$

$$Midrange(class_b) = \frac{161 + 191}{2} = 167 \quad (2)$$