

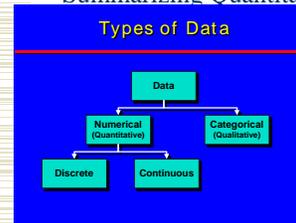
Frequency Distributions

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Sources:
Anderson, Sweeney, Williams, *Statistics for Business and Economics*, 10 e, Thomson, 2008
Sugiyono, *Statistika untuk penelitian*, albeta, Bandung, 2007
<http://business.clayton.edu/arjomand/>

Descriptive Statistics: Tabular and Graphical Presentations

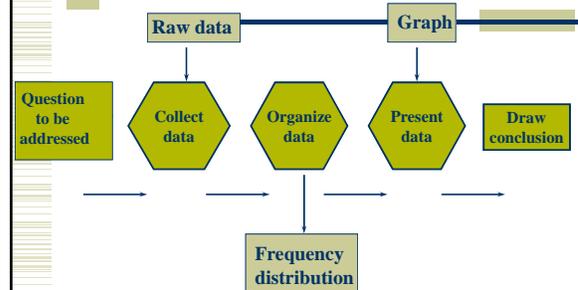
- ◆ Summarizing Qualitative Data
- ◆ Summarizing Quantitative Data



Summarizing Qualitative Data

- ◆ Frequency Distribution
- ◆ Relative Frequency Distribution
- ◆ Percent Frequency Distribution
- ◆ Bar Graph
- ◆ Pie Chart

Construction of a Frequency Distribution



Frequency Distributions

What is a Frequency Distribution?

- ◆ A frequency distribution is a **list or a table** ...
- ◆ containing **class groupings** (categories or ranges within which the data fall) ...
- ◆ and the **corresponding frequencies** with which data fall within each class or category

Why Use Frequency Distributions?

- ◆ A frequency distribution is a way to summarize data
- ◆ The distribution condenses the raw data into a more useful form...
- ◆ and allows for a quick visual interpretation of the data

Class Intervals and Class Boundaries

- ◆ Each class grouping has the same width
- ◆ Determine the width of each interval by

$$w = \text{interval width} = \frac{\text{largest number} - \text{smallest number}}{\text{number of desired intervals}}$$
- Use at least 5 but no more than 15-20 intervals
- Intervals never overlap
- Round up the interval width to get desirable interval endpoints

Frequency Distribution: Discrete Data

- ◆ **Discrete data:** possible values are countable

Example: An advertiser asks 200 customers how many days per week they read the daily newspaper.

Number of days read	Frequency
0	44
1	24
2	18
3	16
4	20
5	22
6	26
7	30
Total	200

Relative Frequency Distribution

- ▶ The **relative frequency** of a class is the fraction or proportion of the total number of data items belonging to the class.
- ▶ A **relative frequency distribution** is a tabular summary of a set of data showing the relative frequency for each class.

Relative Frequency

Relative Frequency: What proportion is in each category?

Number of days read	Frequency	Relative Frequency
0	44	.22
1	24	.12
2	18	.09
3	16	.08
4	20	.10
5	22	.11
6	26	.13
7	30	.15
Total	200	1.00

$$\frac{44}{200} = .22$$

22% of the people in the sample report that they read the newspaper 0 days per week

Frequency Distribution: Continuous Data

- ◆ **Continuous Data:** may take on any value in some interval

Example: A manufacturer of insulation randomly selects 20 winter days and records the **daily high temperature**

24, 35, 17, 21, 24, 37, 26, 46, 58, 30, 32, 13, 12, 38, 41, 43, 44, 27, 53, 27

(Temperature is a continuous variable because it could be measured to any degree of precision desired)

Grouping Data by Classes

Sort raw data in ascending order.

12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58

- ◆ Find range: $58 - 12 = 46$
- ◆ Select number of classes: **5** (usually between 5 and 20)
- ◆ Compute class width: **10** ($46/5$ then round off)
- ◆ Determine class boundaries: **10, 20, 30, 40, 50**
- ◆ Compute class midpoints: **15, 25, 35, 45, 55**
- ◆ Count observations & assign to classes

Frequency Distribution Example

Data in ordered array:
12, 13, 17, 21, 24, 24, 26, 27, 27, 30, 32, 35, 37, 38, 41, 43, 44, 46, 53, 58

Frequency Distribution		
Class	Frequency	Relative Frequency
10 but under 20	3	.15
20 but under 30	6	.30
30 but under 40	5	.25
40 but under 50	4	.20
50 but under 60	2	.10
Total	20	1.00

Percent Frequency Distribution

The **percent frequency** of a class is the relative frequency multiplied by 100.

A **percent frequency distribution** is a tabular summary of a set of data showing the percent frequency for each class.

Relative Frequency and Percent Frequency Distributions



Rating	Relative Frequency	Percent Frequency
Poor	.10	10
Below Average	.15	15
Average	.25	25
Above Average	.45	45
Excellent	.05	5
Total	1.00	100

$.10(100) = 10$

$1/20 = .05$

Steps

- Counting number of class interval $C_n = 1 + 3.3 \log n$
- Counting interval width $W = \frac{\text{range of data}}{\text{number of class interval}}$
- Counting class length $L = \frac{W}{C_n}$
- Arranging class interval (using tallies)
- Draw frequency distributions

Happiness keeps you Sweet,
Trials keep you Strong,
Sorrows keep you Human,
Failures keep you humble,
Success keeps You Glowing,
But Only God keeps You Going!

-- Elvia Shauki--