WIIT 7751

Lesson C Guided Notes

Frequency –

Frequency Distribution –

Example 1 A computer retailer compiles a list of the types of computers sold to the last 50 customers.

Tablet	Laptop	Laptop	Laptop	Laptop
Laptop	Laptop	Notebook	Desktop	Laptop
Notebook	Desktop	Laptop	Laptop	Laptop
Laptop	Notebook	Notebook	Desktop	Laptop
Desktop	Laptop	Tablet	Notebook	Tablet
Notebook	Notebook	Tablet	Laptop	Desktop
Laptop	Laptop	Laptop	Laptop	Desktop
Desktop	Notebook	Laptop	Desktop	Laptop
Desktop	Tablet	Desktop	Laptop	Laptop
Desktop	Tablet	Notebook	Tablet	Laptop

Construct a frequency distribution for these data

Relative Frequency Distribution

A frequency distribution makes it easy to see exactly how many observations are in each category. Sometimes we are interested in the proportion of observations in each category.

The proportion of observations in a category is called the **relative frequency** of the category.

A **relative frequency distribution** is a table that presents the relative frequency for each category.

The relative frequency of a category is the frequency of the category divided by the sum of all the frequencies.

Example 2 Construct a relative frequency distribution for the computer sales data.

Bar Graphs

A **bar graph** is a graphical representation of a frequency distribution. A bar graph consists of rectangles of equal width, with one rectangle for each category. The heights of the rectangles represent the frequencies or relative frequencies of the categories.

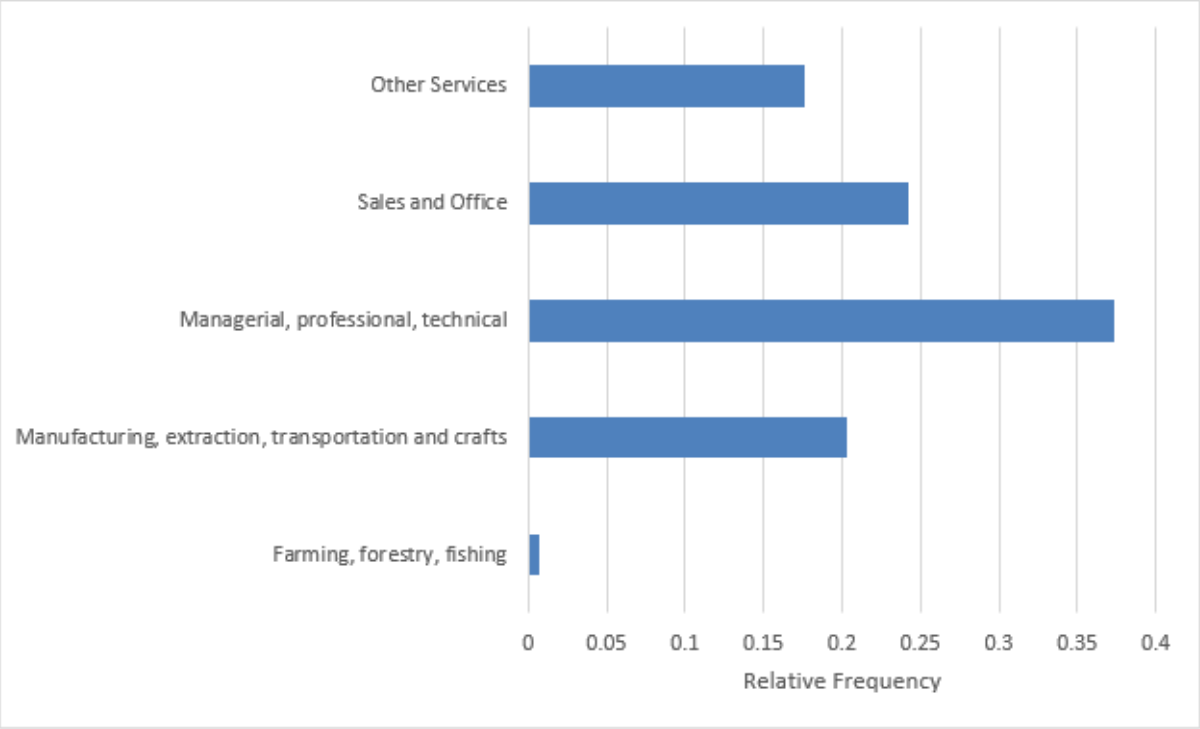
Example 3 Construct a frequency bar graph for the computer sales data.

Type of Computer	Frequency	Relative Frequency
Desktop	11	0.22
Laptop	23	0.46
Notebook	9	0.18
Tablet	7	0.14

The bars in bar charts do not necessarily need to be vertically aligned; oftentimes it is convenient to display the bars horizontally.

Example 4 The following relative frequency distribution categorizes employed U.S. residents by type of employment in the year 2009. Construct a relative frequency bar graph.

Type of employment	Relative Frequency
Farming, forestry, fishing	0.007
Manufacturing, extraction, transportation and crafts	0.203
Managerial, professional, technical	0.373
Sales and Office	0.242
Other Services	0.176

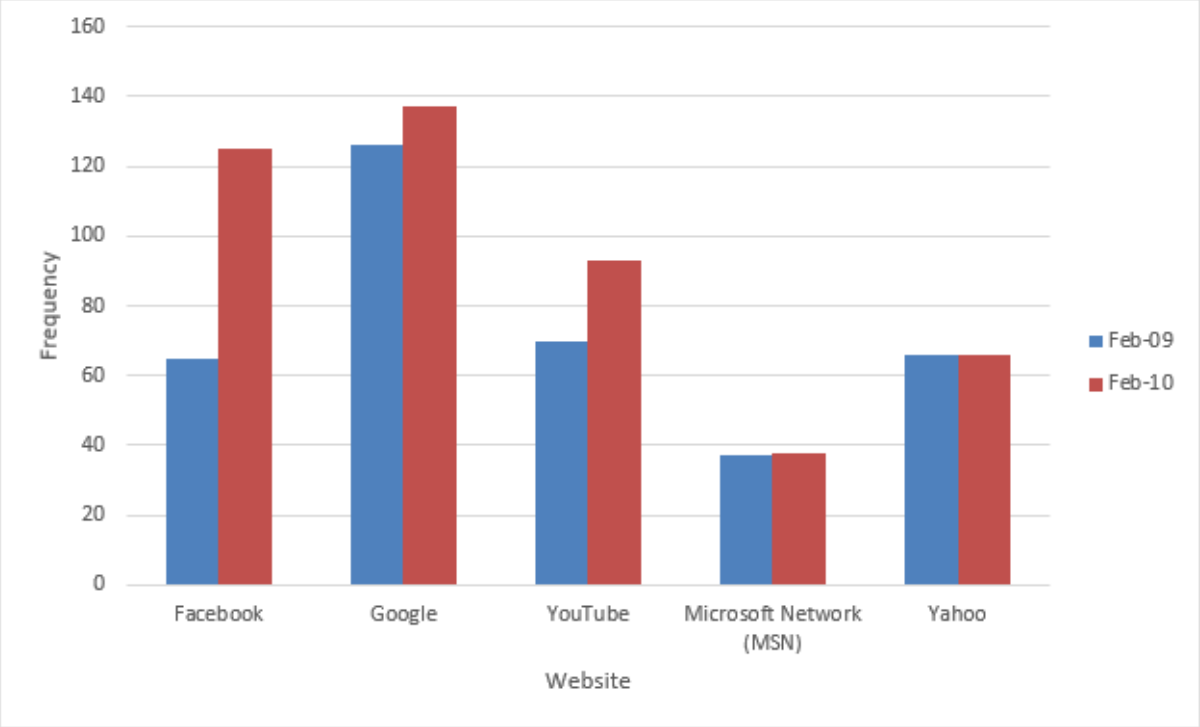


Side-by-Side Bar Graphs

There are times when two graphs for the same categories. Rather than using two separate bar graphs, we can construct a side-by-side bar graph.

Example 5 Below are data for the number of visitors, in millions, to several popular websites in February 2009 and February 2010.

Website	February 2009	February 2010
Facebook	65	125
Google	126	137
YouTube	70	93
Microsoft Network (MSN)	37	38
Yahoo	66	66



Pie Charts

A **pie chart** is an alternative to the bar graph for displaying relative frequency information. A pie chart is a circle. The circle is divided into sectors, each one for a category. The size of each sector is proportional to the relative frequency of the category the given sector represents.

For example, if a category has a relative frequency of 0.40, then its sector takes up 40% of the area of the pie chart.

Example 6 Construct a pie chart for the computer sales data.

Type of Computer	Frequency	Relative Frequency
Desktop	11	0.22
Laptop	23	0.46
Notebook	9	0.18
Tablet	7	0.14

To summarize quantitative data, we use a frequency distribution just like those for qualitative data. Since these data have no natural categories, we divide the data into classes.

Classes are intervals of equal width that cover all values that are observed in the data set.

Lower Class Limit –

Upper Class Limit –

Class Width –

Choosing Classes

- Every observation must fall into one of the classes.
- The classes must no overlap
- The classes must be of equal width
- There must be no gaps between classes. Even if there are no observations in a class, it must be included in the frequency distribution.

Constructing a Frequency Distribution

Following are the general steps for constructing a frequency distribution:

Step 1: Choose a class width.

Step 2: Choose a lower class limit for the first class. This should be a convenient number that is slightly less than the minimum data value.

Step 3: Compute the lower limit for the second class, by adding the class width to the lower limit for the first class:

Lower limit for second class = Lower limit for first class + Class width

Step 4: Compute the lower limits for each of the remaining classes, by adding the class width to the lower limit of the preceding class. Stop when the largest data value is included in a class.

Step 5: Count the number of observations in each class, and construct the frequency distribution.

Example 7 The emissions for 65 vehicles, in units of grams of particles per gallon of fuel, are given.

1.5	0.87	1.12	1.25	3.46	1.11	1.12	0.88	1.29	0.94	0.64	1.31	2.49
1.48	1.06	1.11	2.15	0.86	1.81	1.47	1.24	1.63	2.14	6.64	4.04	2.48
1.4	1.37	1.81	1.14	1.63	3.67	0.55	2.67	2.63	3.03	1.23	1.04	1.63
3.12	2.37	2.12	2.68	1.17	3.34	3.79	1.28	2.1	6.55	1.18	3.06	0.48
0.25	0.53	3.36	3.47	2.74	1.88	5.94	4.24	3.52	3.59	3.1	3.33	4.58

Construct a frequency distribution using a class width of 1.

Class	Frequency
0 .00 – 0.99	
1.00 – 1.99	
2.00 – 2.99	
3.00 – 3.99	
4.00 – 4.99	
5.00 – 5.99	
6.00 – 6.99	

Once we have a frequency distribution or a relative frequency distribution, we can put the information in graphical form by constructing a **histogram**.

A histogram is constructed by drawing a rectangle for each class. The heights of the rectangles are equal to the frequencies or the relative frequencies, and the widths are equal to the class width.

Example 8 Construct a frequency histogram and relative frequency histogram for the particulate emission data.

Class	Frequency	Relative Frequency
0 .00 – 0.99		
1.00 – 1.99		
2.00 – 2.99		
3.00 – 3.99		
4.00 – 4.99		
5.00 – 5.99		
6.00 – 6.99		