

# Relative Frequency Distribution

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**Abstract:** *The following article is about the concepts related to frequencies. It is a perfect way to present a buch of data in an abrivative form. It uses various aspects of staticis like historiography to represent all types of observations in the data.*

**Keywords:** distribution, data tables ,methods, formulas

## I. INTRODUCTION

In statistics, the frequency or absolute frequency of an event  $i$  is the number  $N_i$  of times the observation has occurred/recorded in an experiment or study.

### What is frequency distribution?

Relative frequency of an event is the absolute frequency normalised by the total number of events.

$$f_i = \frac{n_i}{N} = \frac{n_i}{\sum_j n_j} \cdot \text{Relative Frequency} = \frac{\text{Count of Events}}{\text{Total Number of Observations}}$$

A *frequency distribution* is representation, either in a graphical or tabular format, that displays the number of observations within a given interval.

A relative frequency distribution is the proportion or fraction of times a value occurs in a data set. To find the relative frequencies, one can divide each frequency by the total number of data points in the sample. It is very similar to a regular frequency distribution, except that instead of reporting how many data values fall in a class, a relative frequency distribution reports the fraction of data values that fall in a class. These fractions or proportions are called relative frequencies and can be given as fractions, decimals, or percents.

When we want to acces two categorical values together we can use relative frequency in a contingency table

Let's bring them to life by working through an example!

Table example

The relative frequency distribution table below displays the percentage of students in each grade at a small school with 88 students.

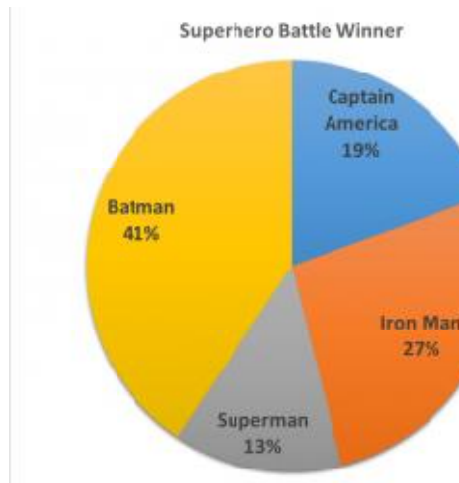
School Grade	Count of Students	Relative Frequency
1	23	26.1%
2	20	22.7%
3	15	17.0%
4	12	13.6%
5	10	11.4%
6	8	9.1%
Total	88	100%

Example:

A researcher asked her class to pick who would win in a battle of superheros. Below is a frequency table and charts of the results:

	Captain America	Iron Man	Superman
Batman	52	25	17

Out of a total of 128 responses, 41% (or 52/128) of students reported that Batman would win the battle, followed by Iron Man with 27%, Captain America with 19%, and Superman with 13%. A pie chart and bar chart of these results are shown below:

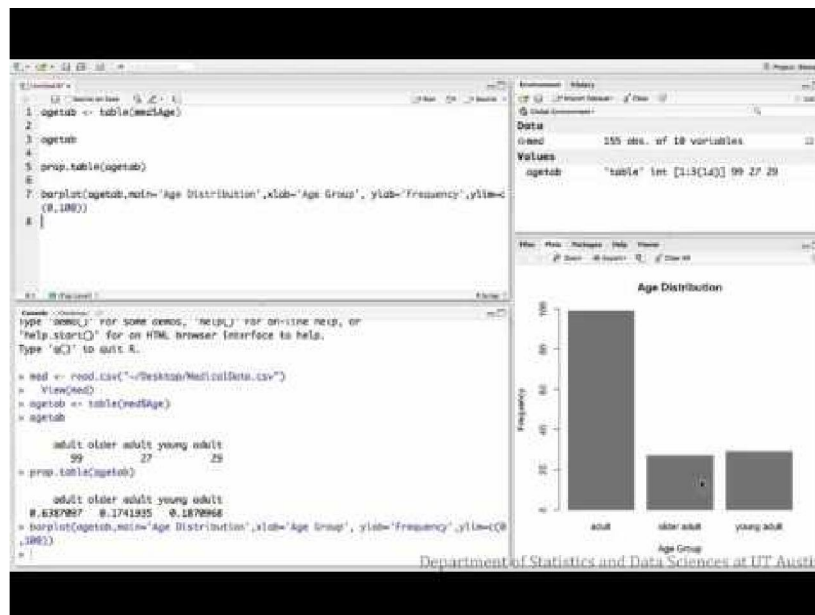


Example 2: Creating a frequency tables and bar charts in RStudio

This video will show how to create a frequency table and bar chart to display the number of patients in different age groups (categorized into young adults, adults, and older adults).

Dataset used in video

R script file used in video



The table techniques can be used in such code methods for precise work and for faster and convenient understanding of data.

### **Data compression**

Shannon's concept of entropy (a measure of the maximum possible efficiency of any encoding scheme) can be used to determine the maximum theoretical compression for a given message alphabet. In particular, if the entropy is less than the average length of an encoding, compression is possible.

The table Relative frequencies of characters in English text shows the relative frequencies of letters in representative English text. The table assumes that all letters have been capitalized and ignores all other characters except for spaces. Note that letter frequencies depend upon the particular text sample.

### **Error-correcting and error-detecting codes**

Shannon's work in the area of discrete, noisy communication pointed out the possibility of constructing error-correcting codes. Error-correcting codes add extra bits to help correct errors and thus operate in the opposite direction from compression. Error-detecting codes, on the other hand, indicate that an error has occurred but do not automatically correct the error. Frequently the error is corrected by an automatic request to retransmit the message. Because error-correcting codes typically demand more extra bits than error-detecting codes, in some cases it is more efficient to use an error-detecting code simply to indicate what has to be retransmitted.

Deciding between error-correcting and error-detecting codes requires a good understanding of the nature of the errors that are likely to occur under the circumstances in which the message is being sent.

### **Cryptology**

Cryptology is the science of secure communication. It concerns both cryptanalysis, the study of how encrypted information is revealed (or decrypted) when the secret "key" is unknown, and cryptography, the study of how information is concealed and encrypted in the first place.