

Stem-and-Leaf Plot as a Tool for Testing the Unimodality of Population

Preambles: The first step in any statistical analysis is to make sure that the population is homogenous, that is, not a mixture of two or more populations e.g., mixture of apples and oranges! Or mixture of goat and sheep weights, in this case, say computed mean belongs to neither. To test this necessary condition one must show that the population density is unimodal.

Unfortunately, when one asks for Summary Statistics, almost all software packages either do not provide the Mode (as in Excel) or provide the first one, “as-if” there is no more possible.

The test for unimodality can be checked either by relative histogram of the Random Sample data or as an alternative one may use the stem-and-leaf plot.

This diagram required that the data be integer. Some online stem-and-leaf platter required the data to be at most 3 digits, or 2 digits, which can be achieved as outlined at the end of this note.

A Stem-and-Leaf plot is much like a histogram, displaying the number of times that an event within a particular range occurs. Yet, the stem-and-leaf plot reveals little more information than a histogram, and it can show the exact data points, without requiring bins:

<http://home.ubalt.edu/ntsbarsh/Business-stat/histograming/topframe.html>

The stem-and-leaf plot is constructed by placing the first digit of each data point on the left hand side of the line, and the remaining digits on the right-hand side on the line, this is a horizontal plot. One rotates this horizontal plot by 90 degrees to get the stem-and-leaf of fallen tree!

Practice the following data that meets the requirement that the data must be integer between 0, and 999 on this plotter. You may copy the data and paste it on data space provided by the following plotter:

<https://www.easycalculation.com/statistics/mean-median-mode.php>

213
219
254
256
268
272
274

285
287
290
295
298
298
313
318
322
330
331
335
348
350
366
373
373
401

As you see test for unimodality is rejected. Therefore any statistical analysis regarding the population based on this sample is meaningless.

As an alternative you may use:

<http://easycalculation.com/statistics/stem-leaf-plot.php>

Data must be integer between 00 and 99: For example reducing the above data to to 2-digits using the first 2 digits or rounding down to two digits, as done below:

21, 22, 25, 26, 27, 27, 27, 28, 29, 29, 29, 30, 30, 31, 32, 32, 33, 33, 34,35, 35, 37, 37, 37, 40

You may copy the data and paste it on data space provided by the last plotter.

Again, as you see this data is not unimodal, i.e., has multiple modes; therefore no statistical analysis can be performed on this set of data. One has to separate the data into sub-set each being unimodal then performing any statistical analysis on each subset separately.

After test for unimodality is passed, one may visually check a **normal density** (a bell-shaped) can fit the data.

How to convert the decimal data into integer with required number of digits?

Step 1: If some data are integer convert them to decimal number by putting .0 (a decimal point and 0) to the end of integer numbers. For example 25 and 25.0 are equivalent. Now all data are in decimal form.

Now there will be one of the following two cases:

Step 2: If number of digits (including zeros) before decimal points is the same for all data, then simply drop the decimal points. Then round them down to meet the requirements, if necessary.

Step 3: If number of digits before decimal point is not the same for all data, then place enough number of zeros to the left of the data, if needed; then Go to step 2.

Back to:

<http://home.ubalt.edu/ntsbarsh/Business-stat/STAT-DATA/Javastat.htm>