Measures of Central Tendency – Median and Mode

Median

1. Median is the value of middle most observation(s).

2. The median is to be calculated only after arranging the data in ascending order or descending order.

To find the Median for raw and arrayed data

To find the median of raw data**,** arrange the raw data in ascending or descending order. Then observe the number of variates in the data. Let it be n. Then find the median as follows.

(a) If n is odd then the $\left(\frac{n+1}{2}\right)^{th}$ variate is the median.

(b) If n is even then the mean of the $\frac{n}{2}^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ variates is the median, i.e.,

$$\text{median} = \frac{\frac{n}{2}^{th}\ \text{variate} + \left(\frac{n}{2}+1\right)^{th}\ \text{variate}}{2}$$

Median for tabulated data

1. Construct a cumulative frequency distribution table

2. If there are n terms in the given distribution, then use the table to find the value of $\left(\frac{n}{2}\right)^{th}$ or $\left(\frac{n+1}{2}\right)^{th}$ term which is the median of given distribution.

Median for grouped data (both continuous and discontinuous)

1. Draw a cumulative frequency curve (Ogive).

2. If there are n terms in the given distribution, then use the ogive to find the value of $\left(\frac{n}{2}\right)^{th}$ or $\left(\frac{n+1}{2}\right)^{th}$ term which is the median of given distribution.

Mode

1. Mode of a statistical data is the value of that variate which has the maximum frequency.

2. The mode for ungrouped data is the value that occurs most often.

3. The mode may be greater than, less than or even equal to the mean.

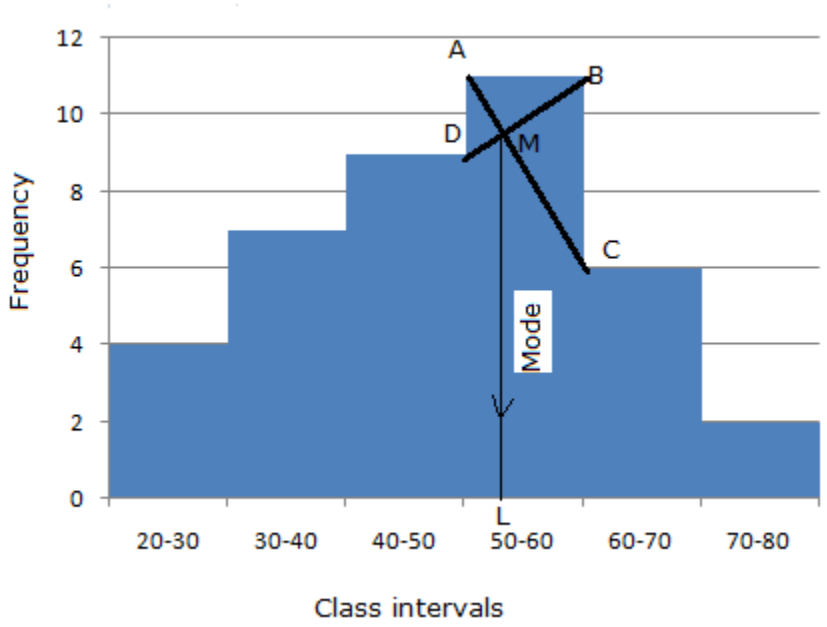
Mode for tabulated data

1. In the case of a grouped frequency distribution a class with maximum frequency is called as the modal class.

To find the mode of a group frequency distribution (using histogram)

Steps:

1. Draw a histogram of the given distribution.
2. Inside the highest rectangle, which represents the maximum frequency (or modal class), draw two lines AC and BD diagonally from the upper corners C and D of adjacent rectangles.
3. The point of intersection is M. Now ML perpendicular to horizontal axis.
4. The value of point L on the horizontal axis represents the value of mode.



Quartiles

1. The three variates which divide the data of a distribution in four equal (quarters) are called quartiles.

2. If there are n terms arranged in an ascending order, then

Lower Quartile (Q_1) = $\left(\frac{n}{4}\right)^{th}$ term, if n is even or $\left(\frac{n+1}{4}\right)^{th}$ term, if n is odd.

3. If there are n terms arranged in an ascending order, then

Upper Quartile (Q_3) = $\left(\frac{3n}{4}\right)^{th}$ term, if n is even or $\left(\frac{3\ n+1}{4}\right)^{th}$ term, if n is odd.

4. Q_2 is called the middle quartile and median is the second quartile.

5. Lower Quartile is that value which cuts off the lowest 25%of the data. It is denoted by Q_1.

6. Upper Quartile is that value which cuts off the highest 25%of the data. It is denoted by Q_3 and is 75^{th} percentile.

7. The difference of the greatest variate and the smallest variate in a distribution is called the range of the distribution.

8. The difference between lower quartile and upper quartile is Interquartile Range and it is equal to Q_3 - Q_1.

9. Interquartile range is always positive, as $Q_3 > Q_1$

10. Semi-interquartile range is equal to $\frac{1}{2}(Q_3 - Q_1)$.