Presentation of Quantitative Data

***Tabular and Graphical Presentation of data:**

Tabular presentation include:

1. Frequency distribution.
2. Relative frequency distribution.
3. Cumulative frequency.
4. Cumulative relative frequency

Graphical presentation include:

1. Histogram.
2. Frequency polygon.
3. Scatter diagrams.
4. Line graph.

THE FREQUENCY DISTRIBUTION

To group a set of observations, we select a set of contagious, non overlapping intervals, such that each value in the set of observation can be placed in one, and only one, of the interval, and no single observation should be missed.

The interval is called: **Class interval**

Number of class interval : Too few intervals are not good because information will be lost. Too many intervals are not helpful to summarize the data.

A commonly followed rule is that number of class interval should be not fewer than *6 and not more than 15.*

The specific guidance to decide the number of classes is (Sturges formula).

k = 1 + 3.322 (log n)

k= number of class intervals.

n= number of observations in the set.

The result should not be regarded as final, but can be regard as guide only.

The number of class intervals obtain by sturges rule can be increase or decrease for convenience and clear presentation.

Range: It is the difference between the largest and the smallest observation in the data set.

R = Largest value – Smallest value

The Width of the interval (w):

Class intervals generally should be of the same width, but sometimes this is impossible to do. Width of class interval can be obtain by the following formula:

$$W = R / K$$

W= Width of the class interval , **R=** Range , **K=** Number of class intervals.

To make the summarization more comprehensible, the class width may be 5 or 10 or the multiples of 10.

Frequency: It determines the number of observations falling into each class interval.

Relative frequency: It determines the proportion of observation in the particular class interval relative to the total observations in the set.

Cumulative frequency: This is calculated by adding the number of observation in each class interval to the number of observations in the class interval above, starting from the second class interval onward.

Cumulative relative frequency: This calculated by adding the relative frequency in each class interval to the relative frequency in the class interval

above, starting also from the second class interval onward.

Cumulative frequency and cumulative relative frequency distributions are used to facilitate obtaining information regarding the frequency or relative frequency within two or more contagious class intervals.

The Mid-interval (midpoint):

It can be computed by adding the lower bound of the interval plus the upper bound of it and then divide by 2.

The Following are the heart rate of 50 patients:

62	97	80	99	52	75	57	93	78	91
76	72	75	79	75	66	89	72	69	71
109	80	65	77	105	97	68	62	74	104
74	67	69	71	68	83	68	88	97	85
62	82	98	101	79	105	79	69	62	73

1. Number of classes :

(K) = 1+3.322 Log 50

= 1+3.322 (1.69)

= 1+ 5.64 = 6.64 ≈ 6

2. Width of class interval W = R/K

= 109 – 52 /6 = 57/6 = 9.5 □ 10

Frequency, cumulative frequency, relative frequency and cumulative relative frequency distribution of heart rate of 50 patients:

Class interval	Frequency	Cumulative frequency	Relative frequency	Cumulative relative frequency
50-59	2	2	0.04	0.04
60-69	13	15	0.26	0.3
70-79	16	31	0.32	0.62
80-89	7	38	0.14	0.76
90-99	7	45	0.14	0.9
100-109	5	50	0.1	1
Total	50		1	

Example:The following are the hemoglobin values (g/100ml) of 30 children receiving treatment for hemolytic anemia.

10.0	**8.7**	**6.7**	**7.8**	**8.9**	**10.8**
9.7	**9.9**	**8.5**	**7.5**	**9.0**	**10.0**
9.1	**9.1**	**8.4**	**10.6**	**10.2**	**8.5**
8.6	**9.7**	**9.7**	**9.6**	**10.2**	**11.4**
12.2	**9.4**	**9.3**	**8.4**	**8.2**	**9.2**

Order the sample observations by size,

6.7	**7.5**	**7.8**	**8.2**	**8.4**	**8.4**
8.5	**8.5**	**8.6**	**8.7**	**8.9**	**9.0**
9.1	**9.1**	**9.2**	**9.3**	**9.4**	**9.6**
9.7	**9.7**	**9.7**	**9.9**	**10.0**	**10.0**
10.2	**10.2**	**10.6**	**10.8**	**11.4**	**12.2**

No. of classes = $1+ 3.322 (\text{Log}_{10}\ 30) \approx 6$

Width = $(12.2 – 6.7) \ / 6 \approx 1$

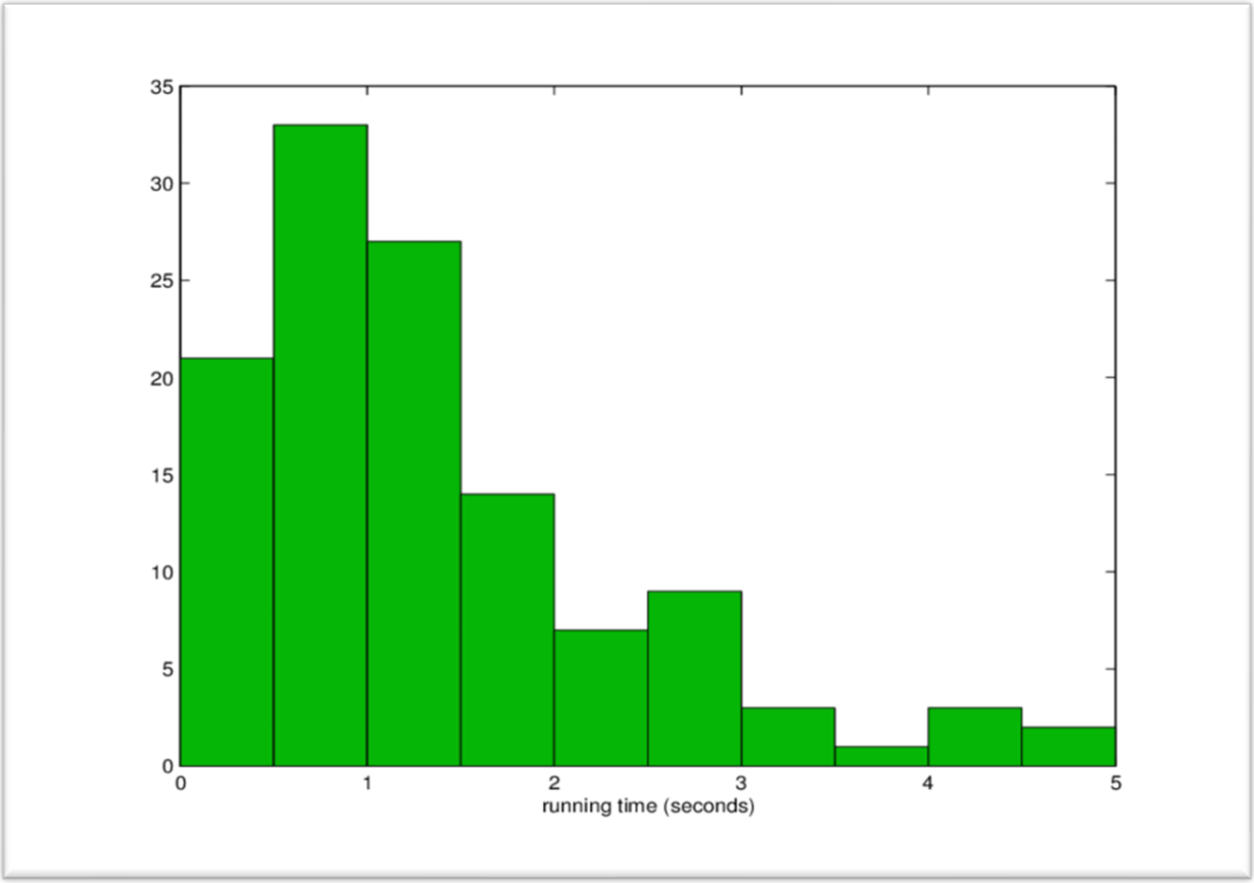
True class limits	Frequency	Midpoint	Cumulative frequency	Relative frequency	Cumulative relative frequency
6.5 -7.5	1	7	1	0.033	0.033
7.5 - 8.5	5	8	6	0.167	0.2
8.5 - 9.5	11	9	17	0.367	0.567
9.5-10.5	9	10	26	0.300	0.867
10.5 - 11.5	3	11	29	0.100	0.967
11.5 - 12.5	1	12	30	0.033	1
Total	30			1	

1.HISTOGRAM

*A common graphical presentation of quantitative data is a histogram.
*The variable of interest is placed on the horizontal axis.
*A rectangle is drawn above each class interval with its height corresponding to the interval's frequency, relative frequency, or percent frequency.

*Unlike a bar graph, a histogram has no natural separation between rectangles of adjacent classes.

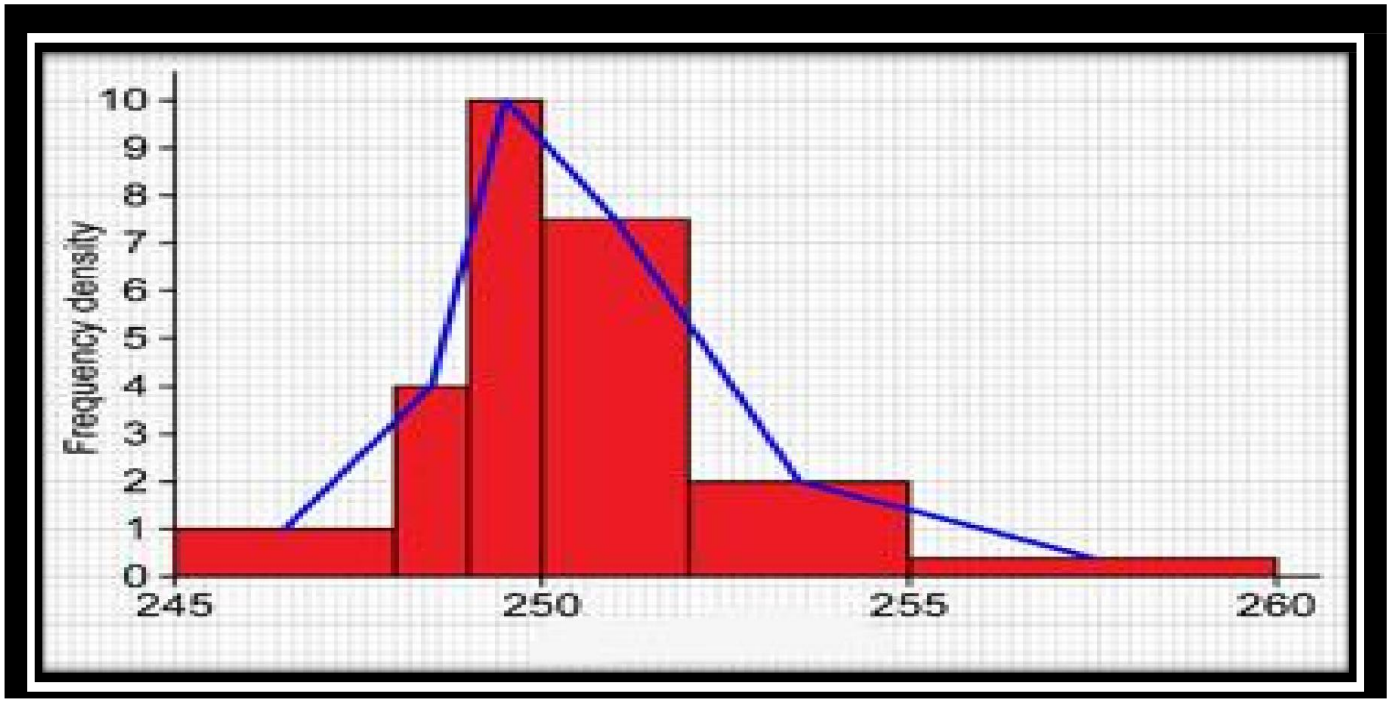
*To draw the histogram, the true classes limits should be used. They can be computed by subtracting 0.5 from the lower limit and adding 0.5 to the upper limit for each interval.



2. FREQUENCY POLYGON

Another form of graphical presentation of frequency distribution of quantitative variables.

It is similar to the histogram, but instead of using rectangles to present data, the midpoint of the top of each rectangle are plotted, and connected together by straight lines.

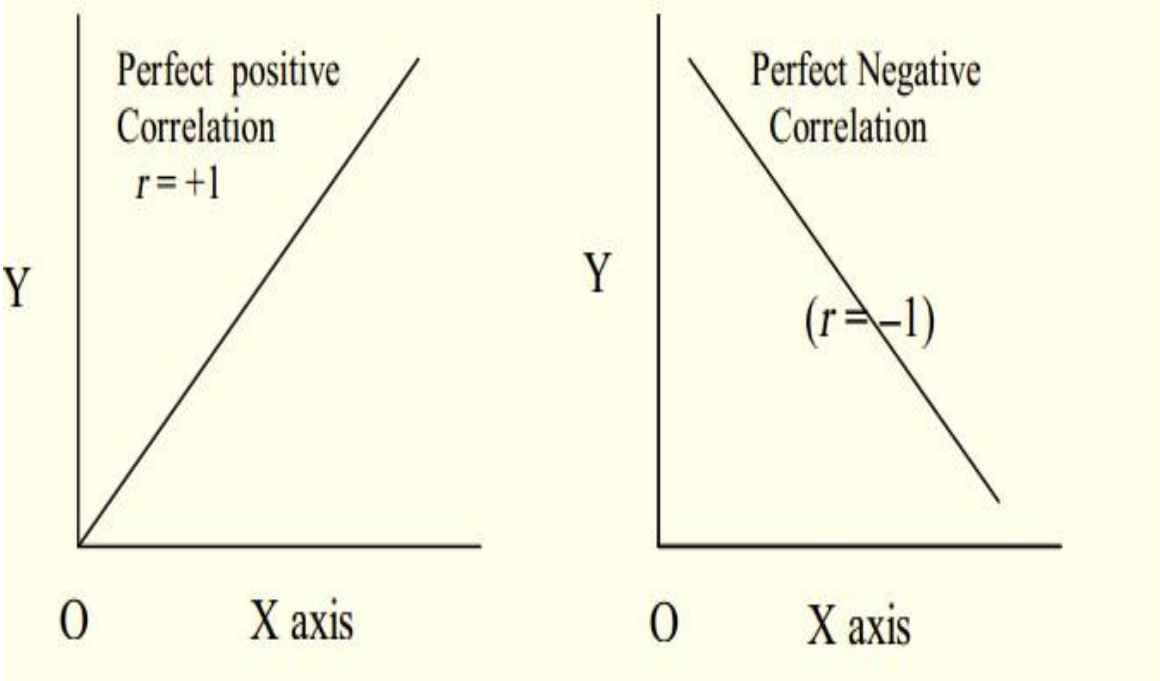


3.SCATTER DIAGRAM

A scatter diagram is a graphical presentation of the relationship between two quantitative variables**.**

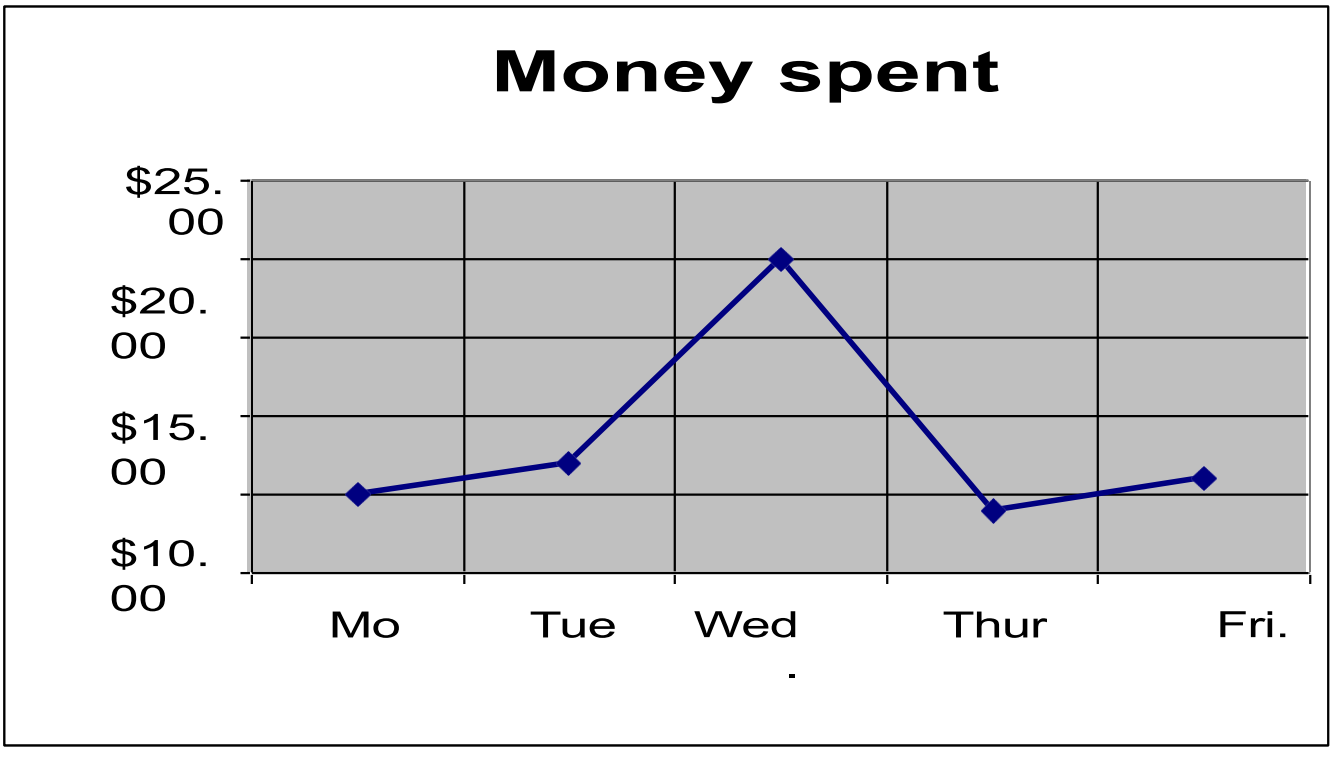
One variable is shown on the horizontal axis and the other variable is shown on the vertical axis.

The general pattern of the plotted points suggests the overall relationship between the variables.



4.LINE GRAPH

A line graph is used to show trend of events with passage of time and show how frequency of particular event change over time. Time could be (Seconds - Minutes - Hours – Days - Weeks - Months – Years - Decades - Centuries – etc).



PICTORIAL PRESENTATION

1. PICTOGRAM

Small pictures or symbols are used to present data.

For example: picture of no horn on road near a hospital.

2. MAP DIAGRAM OR SPOT MAP

These maps are prepared to show the geographical distribution of frequencies of a characteristic.