STUDY ON DIAGRAMMATIC & GRAPHIC REPRESENTATION FOR STATISTICAL DATA USING COMPUTER APPLICATION

Banyar Min Min Tun[1]

Abstract

This paper present rules for drawing diagrams and graphs. There are various design and method for drawing to present statistical data. Computerized simple techniques are illustrated with examples for drawing diagrams and graphs. Then we observed some points of difference between diagrams and graphs.

Keywords: Diagrammatic, Graphic, statistical data

1. INTRODUCTION

The important, appealing and easily understood method of presenting the statistical data is the use of diagrams and graphs. They are nothing but geometrical figures like points, lines, bars, squares, rectangles, circles, cubes etc., pictures, maps or charts. Diagrammatic and graphic representation has a number of advantages. Diagrams are generally more attractive and impressive than the set of numerical data. They are more appealing to the eye and leave a much lasting impression on the mind as compared to the uninteresting statistical figures. ḍ iagrams and graphs are visuals aids, which give a bird's eye view of a given set of numerical data. The data is presented in the simple and understandable form. They register a meaning impression on the mind almost before we think. They also save lot of time, as very little effort is required to grasp them and draw meaningful inferences from them. The technique of diagrammatic representation is made use of only for purpose of comparison. While the comparison could not possible or not necessary, this technique is not used. When properly constructed, diagrams and graphs readily show information that might otherwise be lost amid the detail of numerical tabulations. They highlight the salient features of the collected data; facilitate comparisons among two or more sets of data and enable use to study the relationship between them more readily.

1.1. Objectives of the study

The objectives of the study are-

(i) To know diagrammatic and graphic representation has a number of advantages

(ii) To construct diagrams and graphic charts using computer applications

(iii) To know rules with drawing diagram for statistical data.

1.2. Method of Study

This paper mainly uses in literature survey and the data sources are based on secondary data obtaining from libraries, internet, website. We develop the Diagrams and graphs for statistical data and that the Diagrams and graphs are drawing in Microsoft Excel, and IBM SPSS.

1.3. Scope of the study

This study is focused on method of presenting the statistical data is the use of diagrams and graphs with computer application.

[1] Associate Professor, Department of ICT, Co.operative University, Thanlyin

2. RULES FOR DRAWING DIAGRAMS

1. The first and the most important thing is the selection of a proper scale. No definite rules can be laid down as regards the selection of scale. But as a guiding principle the scale should be selected consistent with the size of the paper and the size of the observations to be displayed so that the diagram obtained is neither too small nor too large.

2. The vertical and horizontal scales should be clearly shown on the diagram itself. The former on the left hand side and the latter at the bottom of the diagram.

3. Neatness should be strictly being written on the top in bold letter and should be very explanatory. If necessary the footnotes may be given at the left hand bottom of the diagram to explain certain points of facts.

3. TYPES OF DIAGRAMS

A variety of diagrammatic devices are used commonly to present statistical data.

(*a*) One Dimensional Diagrams *i.e.*, line diagrams and bar diagrams.

(*b*)Two Dimensional Diagrams *i.e.*, rectangle, squares, circles and pie diagrams.

(*c*) Three Dimensional Diagrams *i.e.*, cubes, spheres, prisms, cylinders etc.

(*d*) Pictograms.

(*e*) Cartograms

3.1 Line Diagram

This is the simplest of all the diagrams. It consists in drawing vertical lines, each vertical line being equal to the frequency. The variate values are presented on a suitable scale along the X-axis and the corresponding frequencies are presented on a suitable scale along Y-axis.

3.2 Bar Diagram

ț he terms ‘bar’ is used for a thick wide line. ț he width of the bar diagram shows merely to make the diagram more explanatory. Bar diagrams are one of the easiest and the commonly used diagram of presenting most of the business and economics data. They consist of a group of equidistant rectangles one for each group or category of the data in which the length or height of the rectangles represents the values or the magnitudes, the width of the rectangles being arbitrary. There are various types of bar diagrams.

(a) Simple Bar Diagram

It is used for comparative study of two or more items or values of a single variable or category of data.

(b) Subdivided Bar Diagram

If a magnitude is capable of being broken into component parts or if there are independent quantities which form the subdivisions of the total, in either of these cases, bars may be subdivided into the ratio of the various components to show the relationship of the parts to the whole.

(c) Percentage Bar Diagrams

(i) Subdivided bar diagrams presented graphically on percentage basis give percentage bar diagrams. They are especially useful for the diagrammatic portrayal of the relative changes in the data.

(ii) Some other bar diagrams are multiple bar diagram, Deviation bar, broken bars etc. The number of sets of correlated data are represented in a multiple bar diagram. The method of drawing multiple bar diagram is the same as that of simple bar diagram. Deviation bars are popularly used for representing net quantities excess or deficit, i.e., net loss, net profit etc. Such types of bars have both positive and negative values. Obviously positive values are shown above the base line and negative values below the base line.

3.3 One Dimensional Diagram

In one dimensional diagram magnitude of the observations are represented by only one of the dimension. *i.e.*, height (length) of the bars while the widths of the bars is arbitrary and uniform.

3.4 Two Dimensional Diagrams

In two dimensional diagrams, the magnitude of given observations are represented by the area of the diagram. Thus the length as well as width of the bars will have to be considered. It is also known as are diagram or surface diagram. Some two dimensional diagrams are

(a) Rectangle diagram: A rectangle is a two dimensional diagram because area of rectangle is given by the product of its length and widths. *i.e.*, length and width of the bars is taken into consideration.

(b) Square Diagram: It is specially useful, if it is desired to compare graphically the values or quantities which differ widely from one another. The method is not complicated to draw a square diagram. First of all take the square root of the values of the given observations and then squares are drawn with sides proportional to these square roots, on an appropriate scale, which must be satisfied.

(c) Circle diagrams: Circle diagrams are alternative to square diagrams and are used for the same purpose. The area of circle, which represents the given values, is given πr^2, where $\pi = 22/7$ and r is the radius of circle. That is the area of circle is proportional to the square of its radius and consequently, in the construction of the circle diagram the radius of circle is a value proportional to the square root of the given magnitude.

(d) Pie diagram: Pie diagram are also called circular diagrams.

3.5 Three Dimensional Diagrams

Three dimensional diagrams are also known as volume diagrams, consists of cubes, cylinders spheres etc. length, width and height have to be taken into account. When the difference range is very obvious between the largest and smallest value, three dimensional diagrams are used. Of the various three dimensional diagrams, ‘cubes’ are the smallest and most commonly used devices of diagrammatic presentation of the data.

3.6 Pictograms

Pictogram is the technique of presenting statistical data through appropriate pictures and is one of very important key particularly when the statistical facts are to be presented to a layman without any mathematical background. Pictograms have some limitations also. They are difficult to construct and time consuming. Besides, it is necessary to one symbol to

represent a fixed number of units, which may create difficulties. It gives only an overall picture, not give minute details.

3.7 Cartograms

For expressing the quantitative information on a geographical basis, the statistical maps or Cartograms are used. Cartograms are simple and elementary forms of visual presentation and are easy to understand. Normally it is used when the regional or geographical comparisons are to be required to highlight.

4. GRAPHIC REPRESENTATION OF DATA

Graphs are used to study the relationship between the variables. Graphs are more obvious, precise and accurate than diagrams and can be effectively used for further statistical analysis, viz., to study slopes, forecasting whenever possible. The special type of paper, a graph paper, is used to draw the graph. Graph paper has a finite network of horizontal and vertical lines; the thick lines for each division of a centimeter or an inch measure and thin lines for small parts of the same. Graphs are classified in two parts.

1. Graphs of frequency distribution
2. Graphs of time series

4.1 Graphs of Frequency Distribution

The so-called frequency graphs are designed to reveal clearly the characteristic features of a frequency data. The most commonly graph for charting a frequency distribution of the data are:

(a) Histogram: A frequency density diagram is a histogram. According to Opermann, "ā histogram is a bar chart or graph showing the frequency of occurrence of each value of the variable being analyzed". īn another way we say that, a histogram is a set of vertical bars whose areas are proportional to the frequencies represented. When building the histogram, the x-axis takes the variable and the y-axis takes the frequencies of this variable. It applies in general or when class intervals are equal.

In each case the height of the rectangle will be proportional to the frequencies. When class intervals are unequal, a correction for unequal class intervals is required. For making the correction we take that class which has lowest class interval and adjust the frequencies of other classes. The height of rectangle is divided by two when one class interval is twice as wide as the lowest class interval. The height of rectangle is divided by three, if it is three times.

(b) Frequency Polygon: 'Polygon' literally means 'many-angled' diagram. ṭ he graph of frequency distribution is known as frequency polygon. To compare two or more frequency distribution, this type of graph is effective. There are two ways for constructing frequency polygon.

(c) Frequency Curve: A frequency curve is a smooth free hand curve drawn through the vertices of a frequency polygon. The area enclosed by the frequency curve is same as that of the histogram or frequency polygon but its shape is smooth one and not with sharp edges. Smoothing should be done very carefully so that the curve looks as regular as possible and sudden and sharp turns should be avoided. A variety of frequency curves could be risen due to the different types of data.

(i) **Symmetrical Curve**: In this type of curve, the class frequencies first rise steadily, reach a maximum and then fall in the same identical manner.

(ii) **Asymmetrical (skewed) frequency Curves**: A frequency curve is said to be skewed if it is not symmetrical.

(iii) **U- Curve:** The frequency distributions in which the maximum frequency occurs at the extremes (i.e., both ends) of the range and frequency keeps on falling symmetrically (about the middle), the minimum frequency being attained at the centre, give rise to a U-shaped curve.

(iv) **J-shaped curve:** In a_J-shaped curve the distribution starts with low frequencies in the lower classes and then frequencies increase steadily as the variable value increases and finally the maximum frequency is attained in the last class. Such curves are not regular but become unavoidable in certain situations.

(d) Cumulative frequency curve or Ogive: Ogive, pronounced Ojive, is a graphic presentation of the cumulative frequency distribution. There are two types of cumulative frequency distributions. One is 'less than' ogive and second is 'more than' ogive. The curve obtained by plotting cumulative frequencies (less than or more than) is called a cumulative frequency curve of an ogive.

(i) **Less than Method:** In this method we start with the upper limits of the classes and go on adding the frequencies. The rising curve can get by plotting these frequencies.

(ii) **More than Method**: In this method we start with the lower limits of the classes and from the frequencies we subtract the frequency of each class. The declining curve can get by plotting these frequencies.

4.2 Graphs of Time-Series

A time series is an arrangement of statistical data in a chronological order i.e., with respect to occurrence of time. The time series data are represented geometrically by means time series graphs which is also known as Histogram. The various types of time series graphs are-

1. Horizontal line graph or histograms
2. Net balance graphs
3. Range or variation graphs
4. Components or band graphs.

5. SOME COMPUTER APPLICATION FOR DRAWING DIAGRAMS AND GRAPHS

There are many application software in computer system for drawing diagrams and graphs. In this paper we state two applications such as;

1. Microsoft Office Excel
2. IBM SPSS.

5.1 Charts from Microsoft Office Excel

To create a chart, enter your data in a worksheet and then click the type of chart you want under the Charts group. The following data to the right is going to be used as an example. Once a chart is selected from the charts group, three new tabs, **Design**, **Layout**, & **Format**, will appear on the ribbon, grouped together under Chart Tools. The Chart Tools

Design tab is used to setup a chart. First, you need to set your data source by clicking **Select Data** under the Data group. The chart data range can be added in a Select Data Source window. We can highlight the cells that we want to show in the chart.

Using the data set as shown above, we now have the data range set for our chart. You can now specify how you want your legend and axis labels to appear. In the example to the left, the legend will display the colors and the axis label will display as "People who prefer". If you click the **Switch Row/Column** button, it will swap the legend and axis labels (for example, "People who prefer" would now be on the legend and the names of the colors would appear on the axis.) Once you have the data source set, click the OK button. The example displays the following graph:

Now that the chart has been created, the design chart tools tab can be used to change the chart to a different type of chart, change the layout of the chart or apply a chart style.

The Chart Tools Layout tab is used to set labels for the title, axes, legends, and data labels on the chart. It can also be used to set axes options, add backgrounds, and add trend lines The Chart Tools Format tab is used to apply formatting options to the chart, such as selecting a predefined style for the shape or manually setting fill, outline, and effects options for shapes.

Color	People who prefer
Red	51
Orange	36
Yellow	19
Green	47
Blue	78
Purple	23

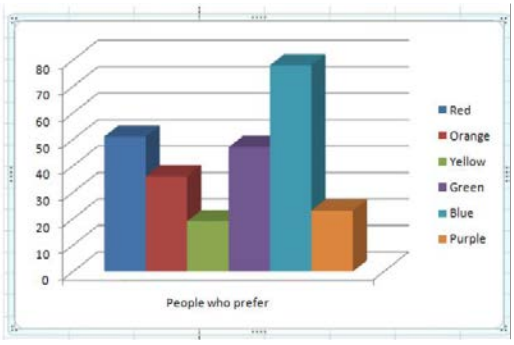

Fig 1

5.2 Charts from IBM SPSS

Although some statistical procedures can create charts, we can also use the Graphs menu to create charts.

- From the menus choose: Graphs > Chart Builder...
- Click the Gallery tab (if it is not selected).
- Click Bar (if it is not selected).
- Drag the Clustered Bar icon onto the canvas, which is the large area above the Gallery.
- Scroll down the Variables list, right-click *Wireless service [wireless]*, and then choose Nominal as its measurement level.
- Drag the *Wireless service [wireless]* variable to the *x* axis.
- Right-click *Owns PDA [ownpda]* and choose Nominal as its measurement level.
- Drag the *Owns PDA [ownpda]* variable to the cluster drop zone in the upper right corner of the canvas.
- Click OK to create the chart.

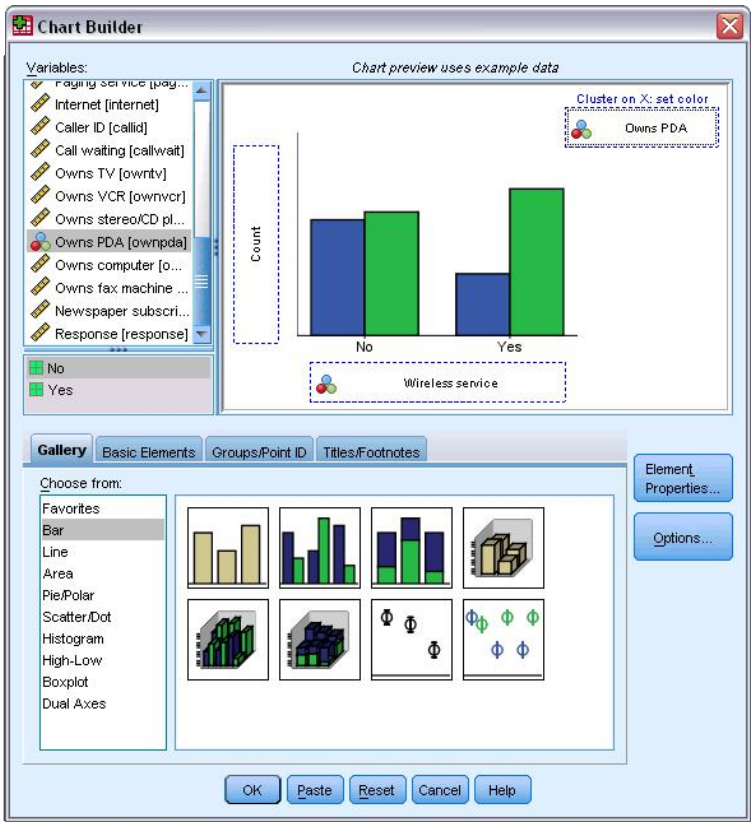

Fig 2

Generally, when we create diagrams and graphs in descriptive statistics, we are occurred suitable diagrams and graphs for measurement level as shown in Table 1.

Measurement Level	Descriptive Statistics	Diagrams	Graphs
Nominal	Frequencies, percentage, mode	Bar, Pie	-
Ordinal	Frequencies, percentage, Median, mode, percentiles	Bar, Pie,	steam & leaf
Interval	Frequencies, percentage, Mean, Median, mode, Variance, percentiles Std deviation, Skewness, Kurtosis	Bar, Pie	Line, steam & leaf Boxplot Histogram

Table 1

5.3 Compare of Excel software and SPSS software

Excel software contain more diagrams than graphs (Fig 3). SPSS software contain same amount of diagrams and graphs (Fig 4). We will use Excel software to draw diagrams and SPSS software for graphs.

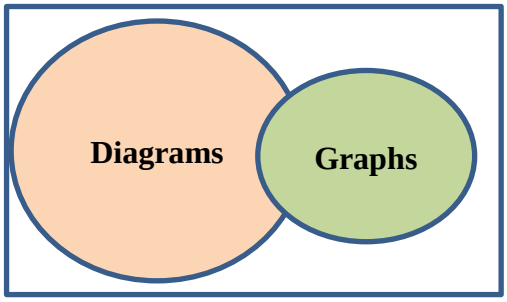

Fig 3

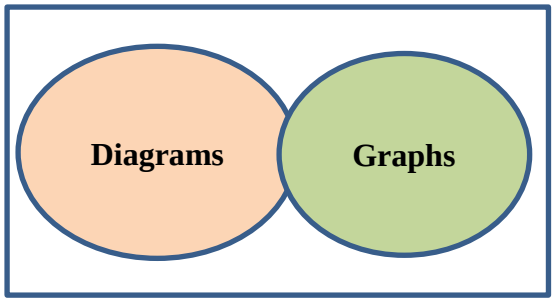

Fig 4

6. CONCLUSION

In this paper we occurred difference between graphs and diagrams. There are no certain method to distinguish between diagrams and graphs but some points of difference are occurred-

1. Generally graph paper is used in the construction of the graph, which helps us to study the mathematically relationship between the two variables, whereas diagrams are generally constructed on a plain paper and used for comparison only not for studying the relationship between two variables.
2. In graphic mode of representation points or lines (dashes, dot, dot-dashes) of different kinds are used to represent the data while in diagrammatic representation data are presented by bars, rectangles, circles, squares, cubes, etc.
3. Diagrams furnish only approximate information. They do not add anything to the meaning of the data and therefore, are not of much use to a statistician or researcher for further statistical analysis. On the other hand graphs are more obvious, precise and accurate than the diagrams and are quite helpful to the mathematician for the study of slopes, rate of change and estimation *i.e.*, interpolation and extrapolation, whenever possible.
4. Construction of graphs is easier as compared to the construction of diagrams. Diagrams are useful in depicting categorical and geographical data but it fails to present data relating to frequency distributions and time series.

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