

St. Francis Institute of Technology
Department of Computer Engineering

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Subject: Human Machine Interaction

Class / Branch / Division: BE/COMP/A

Experiment No:- 8

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AIM : Learn to use statistical graphs

I - THEORY :

1. What is a well designed statistical graph.

A statistical graphic is data presented in a graphical format. A well-designed statistical graphic, also referred to as a chart or graph, consists of complex ideas communicated with clarity, precision, and efficiency. It gives its viewer the greatest number of ideas, in the shortest time, and in the smallest space, and with least possible clutter. It will also induce the viewer to think of substance, not techniques or methodology. It will provide coherence to large amounts of information by tying them together in a meaningful way, and it will encourage data comparisons of its different pieces by the eye. A well designed statistical graphic display also avoids distortions by telling the truth about the data.

2. Explain the types of statistical graphs

1. Line Graphs : A line graph is a type of chart used to show information that changes over time. We plot line using several points connected by straight lines. We also call it a line chart. The line graph comprises of two axes known as 'x' axis and 'y' axis. The horizontal axis is known as the x-axis. The vertical axis is known as the y-axis.

Types of Line Graph

- Simple Line Graph : In a simple line graph, only one line is plotted on the graph. One of the axes defines the independent variables while the other axis contains dependent variables.
 - Multiple Line Graph : Multiple line graphs contain two or more lines representing more than one variable in a dataset. This type of graph can be used to study two or more variables over the same period of time.
 - Compound Line Graph :A compound line graph is an extension of the simple line graph, which is used when dealing with different groups of data from a larger dataset. Each line in a compound line graph is shaded downwards to the x-axis. In a compound line graph, each group of data represented by a simple line graph is stacked upon one another.
2. Surface Charts : Surface Chart (3D Surface Plot) displays a set of three-dimensional data as a mesh surface. It is useful when you need to find the optimum combinations between two sets of data. The colors and patterns in Surface Charts indicate the areas that are in the same range of values by analogy with a topographic map.
- A typical 3D Surface Plot is constructed from three variables: X, Y, and Z. Two of them are independent, located on the horizontal axes. The other is dependent, shown along the vertical axis. Hence, Surface Charts represent a functional relationship between a designated dependent variable and two independent ones.
3. Scatter plots : Scatter plots are charts used to visualize random variables with dot-like markers that represent each data point. These markers are usually scattered across the chart area of the plot.

Types of Scatter Plot : Scatter plots are grouped into different types according to the correlation of the data points. These correlation types are highlighted below

- Positive Correlation : Two groups of data visualized on a scatter plot are said to be positively correlated if an increase in one implies an increase in the other. A scatter plot diagram can be said to have a high or low positive correlation.
- Negative Correlation : Two groups of data visualized on a scatter plot are said to be negatively correlated if an increase in one implies a decrease in the other A scatter plot diagram can be said to have a high or low negative correlation.

- No Correlation : Two groups of data visualized on a scatter plot are said to have no correlation if there is no clear correlation between them.
4. Bar Graphs : A bar chart is a graph represented by spaced rectangular bars that describe the data points in a set of data. It is usually used to plot discrete and categorical data. The horizontal axis of the chart represents categorical data while the vertical axis of the chart defines discrete data. Although the rectangular bars in a bar chart are mostly placed vertically, they can also be horizontal.

Types of Bar Chart :

- Grouped Bar Chart : Grouped bar charts are used when the datasets have subgroups that need to be visualized on the graph. Each subgroup is usually differentiated from the other by shading them with distinct colors.
 - Stacked Bar Chart : The stacked bar graphs are also used to show subgroups in a dataset. But in this case, the rectangular bars defining each group are stacked on top of each other.
 - Segmented Bar Chart : This is the type of stacked bar chart where each stacked bar shows the percentage of its discrete value from the total value. The total percentage is 100%
5. Pie Charts : A pie chart is a circular graph used to illustrate numerical proportions in a dataset. This graph is usually divided into various sectors, where each sector represents the proportion of a particular numerical element in the set. A pie chart is a circular graph used to illustrate numerical proportions in a dataset. This graph is usually divided into various sectors, where each sector represents the proportion of a particular numerical element in the set.

Types of Pie Chart

- Simple Pie Chart : This is the most basic type of pie chart and can also be simply called a pie chart.
- Exploded Pie Chart : In an exploded pie chart, one of the sectors of the circle is separated (or exploded) from the chart. It is used to lay emphasis on a particular element in the data set.

- Pie of Pie : As the name suggests, a pie of pie is a chart that generates an entirely new (usually small) pie chart from the existing one. It can be used to reduce clutteredness and lay emphasis on a particular group of elements.
- Bar of Pie : This is similar to the pie of pie, with the main difference being that a bar chart is what is generated in this case rather than a pie chart.
- 3D Pie Chart : This is a type of pie chart that is represented in a 3-dimensional space.

II - OBJECTIVE :

To make the use of statistical graphics.

III - PROCEDURE :

1. Firstly we need Microsoft Office installed.
2. Once it is installed go to Start -> Programs -> Microsoft Office -> Microsoft Excel
3. Choose an existing spreadsheet by clicking "Open" in the "File" menu. Create a new spreadsheet by clicking "New" in the document wizard or File menu.
4. To create graph we need to prepare the data with some variables , these variables are column title.
5. The variables will be independent or dependent as per the data series that is being created.
6. Once data is ready we can start creating graphs , now click on "Charts" tab. If charts tab is not visible go to "Charts" in "Insert" Tab.
7. Now select the whole data series with columns and rows by dragging the mouse from the top left corner of the tables to bottom right corner of it.
8. Now you will see multiple types of chars as shown below.



In Other Charts option



9. We can select the type of chart we want to select, say if we select Line chart , if we click on it we will get some options like as shown below



10. We can select any subtype of line chart. Once the chart is made we can change its design by going to the "Design" Tab.



11. You can select the chart layout, designs, colors as desired.
12. Once chart is created you can save it.
13. We will create Pie, Stacked Bar, Line, Surface and Scatter charts which we discussed in the theory above.

IV - TOOL :

Name : Microsoft Excel

Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It features calculation, graphing tools, pivot tables, and a macro programming language called Visual Basic for Applications (VBA). It has been a very widely applied spreadsheet for these platforms, especially since version 5 in 1993, and it has replaced Lotus 1-2-3 as the industry standard for spreadsheets. Excel forms part of the Microsoft Office suite of software.

V - IMPLEMENTATION :

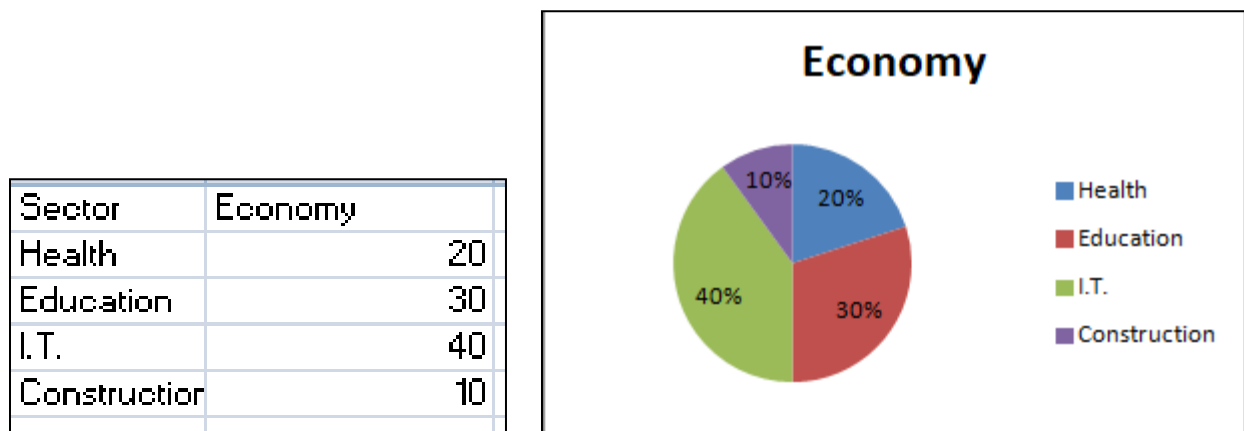


Figure 5.1 : Pie Chart

Movie Title	Tickets Sold	Week1 Sales
Iron Man 3	1000000	300000
Star Wars	900000	200000
Man of Steel	850000	100000
Star Trek	700000	150000

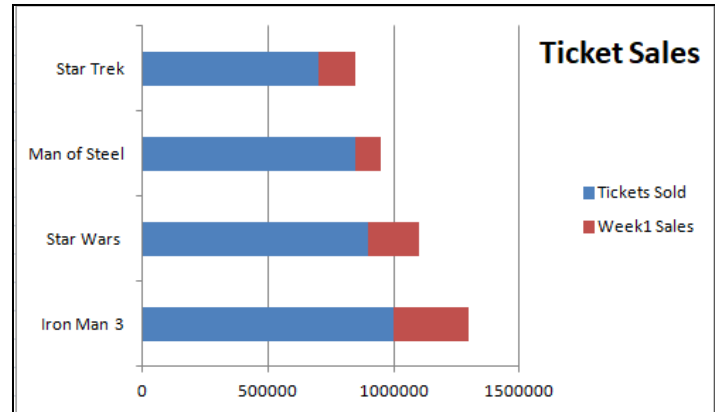


Figure 5.2 : Stacked Bar Chart

Month	Product Value
Jan	131.23
Feb	221.34
Mar	232.11
Apr	190.3
May	220.1
Jun	270.3

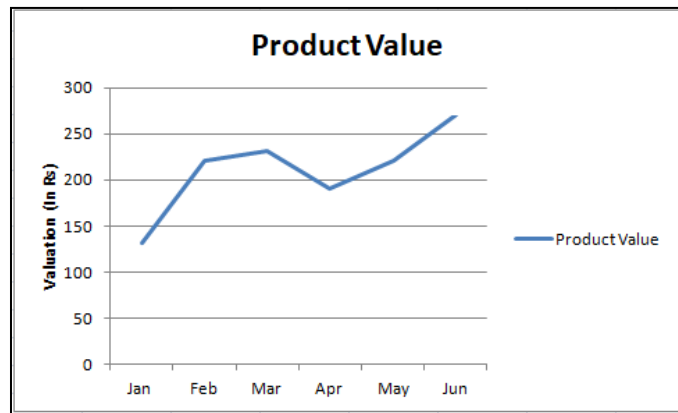


Figure 5.3 : Line Chart

Temperature	Ice cream Sales
14	215
16	224
12	200
11	185
19	295
22	332
24	340
29	410
35	500
30	425

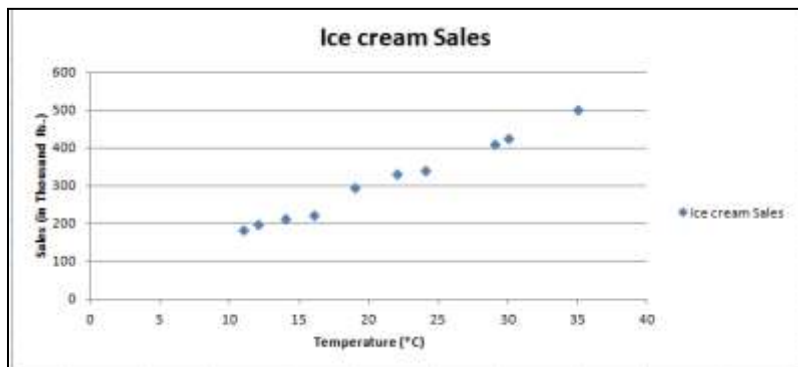


Figure 5.4 : Scatter Plot Chart

Pokemon	Butterfree	Vulpix	Magnemite
HP	60	38	25
Atk	45	41	20
Def	50	40	15
Speed	70	65	90
Sp. Atk.	90	50	105
Sp. Def.	80	65	55

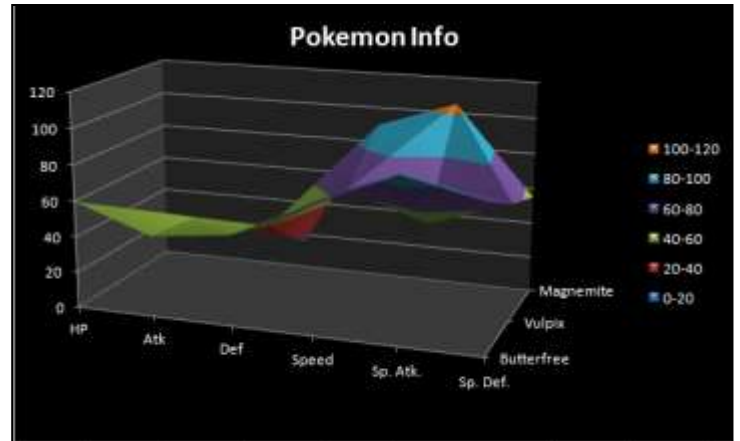


Figure 5.5 : Surface Chart

VI - CONCLUSION :

From this experiment we learnt about the statistical graphs. A well-designed statistical graphs also referred to as a chart or graph, consists of complex ideas communicated with clarity, precision, and efficiency. We understood types of graphs like curve and line graphs, surface charts, scatter charts, bar charts and pie charts. Finally we used Microsoft Excel and implemented these graphs as per the rules of well designed graphs.

VII - POST LAB QUESTION ANSWERS :

1. List the type of bar graphs.

Answer :

- Grouped Bar chart
- Segmented Bar Chart
- Stacked Bar chart

2. List the Basic components of statistical graphics

Answer:

1. Atleast two axes
2. Atleast Two scales
3. An Area to present the data
4. Title
5. Legends and Key

VIII - REFERENCES :

1. https://en.wikipedia.org/wiki/Microsoft_Excel
2. <https://www.splashlearn.com/math-vocabulary/geometry/line-graph>
3. <https://www.formpl.us/resources/graph-chart/>
4. <https://www.anychart.com/chartopedia/chart-type/surface-chart/>