Workshop
Spreadsheet

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2016

Motivation

The Charts
Pie-Chart
Bar-Chart
Line Chart
Scatter Chart

Concluding
Remarks

Workshop on
Spreadsheet in Engineering

Session: Plotting in Spreadsheet

The Whisker Plot

Presented by: **P. K. Yadav & C. Gupta**
Civil Engg   06.Nov.2016

Plot, what and why?

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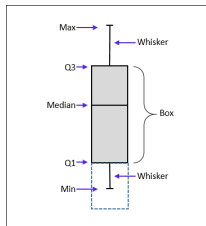
The Wikipedia definition of a plot.

> "A plot is a graphical technique for representing a data set, usually as a graph showing the relationship between two or more variables."

Essentially plots are used for:

- Visualizing relationship
- Quantifying relationship

As a beginner we will focus on "visualizing".

Plot, what and why?

Plot Components

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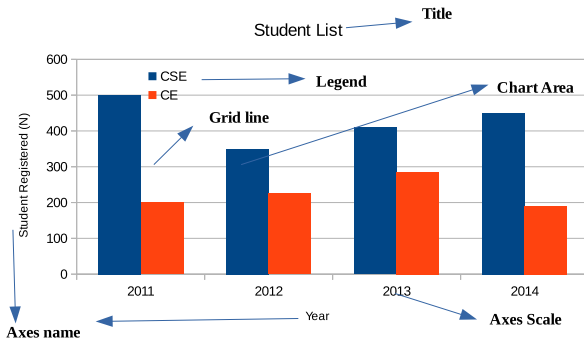Spreadsheet

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A graph is an organized way of presenting information. Therefore, a good informative graph requires several components that are fundamental for its purpose. An informative graph should contain:

Plot, what and why?

Plot Types

There are 100's of different type of plots. A key question is which plot to choose for our data.

In this workshop we limit to following type of plots:

1. Pie-Graph: A **circular** statistical graphic, which is divided into slices to illustrate numerical proportion.

2. Bar Graph: A graph that uses either horizontal or vertical **bars** to show comparisons among categories.

3. Line Graph: A type of chart which displays information as a series of data points called 'markers' connected by straight line segments. It can be used for categorical data.

4. Scatter Plot: A graph comparing between two values. This can be considered the most important graph for Engineers and Scientists.

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Pie-Chart

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In a pie chart, the arc length of each slice is proportional to the quantity it represents.

An example of a piechart

Let us learn to make a piechart in a spreadsheet
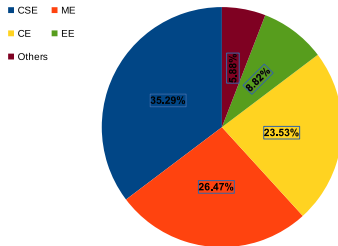
Pie-chart is not very common in scientific literature. It has been found that comparison by angle was less accurate than comparison by length.

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Pie-Chart Types

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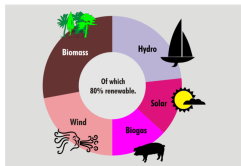& C. Gupta,
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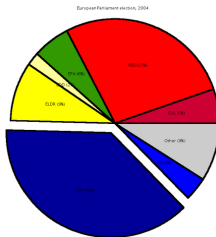The Charts
Pie-Chart
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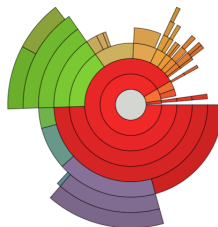Concluding
Remarks

Few of many different types of pie-chart are:

1: A donut pie-chart

2: An exploded pie-chart

3: A multilevel pie-chart

Few other types of pie-chart has been developed in recent times. You may explore them in the spreadsheet also here.

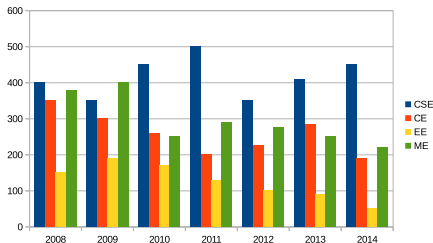For more details on pie-chart, check here.

Bar-Graph

Bar graphs charts provide a visual presentation of categorical data. Categorical data is a grouping of data into discrete groups, such as months of the year, age group etc.

An example of a Bar-Graph

Let us learn to make a bar-graph in a spreadsheet

Bar graph is extensively used in the Engineering, Sciences and as well as Social research works.

Bar-Graph
Types

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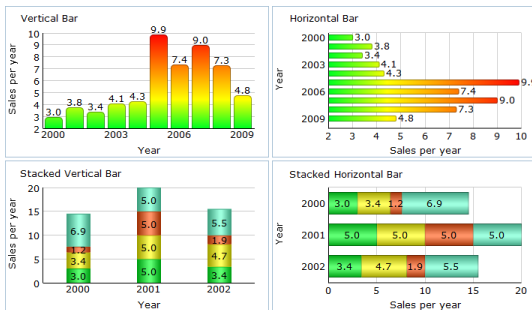Scatter Chart

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The two most common bar graph are: Vertical bar-graph and the horizontal Bar-graph. Apart from there are several variants of Bar-graph. The picture below presents a few of them:


Types of bar-graph (source: here)

More information on bar chart can be obtained from Wikipedia

Line-Graph

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Line charts provide a simple way to visualize a sequence of values, and are especially useful when you want **to see trends** over time, or to forecast future values.

An example of a Line-Graph

Let us learn to make a line-graph in a spreadsheet

Yearly January CO2 Concentration
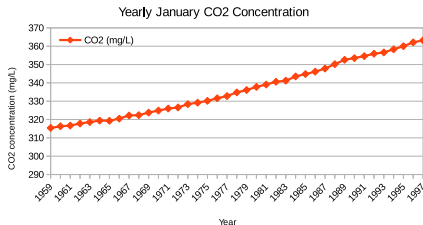
Apart from showing trend, line graph can also be used to compare several data sets that varies over the same independent variable (X-axis).

More information on bar chart can be obtained from Wikipedia

Scatter-Graph

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Scatter graph are essentially line plot but without the connecting line between the data points.
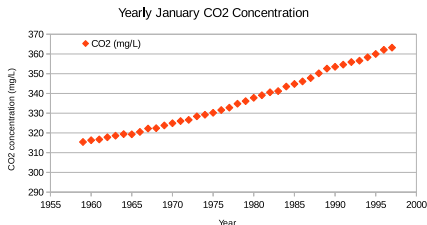
This let Scatter plots for determining the relationship between the independent variable (usually in X-axis) with the dependent variable (usually in Y-axis).

Therefore, the relationship $y = f(x)$ can be established from this graph. Hence, it is among the most important graph in Engineering and Science.

Let us learn to make a scatter-graph in a spreadsheet

An example of a Line-Graph

Yearly January CO2 Concentration

Scatter-Graph
Trend Line

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A fitting line also loosely called trend-line can be established from scatter plot.
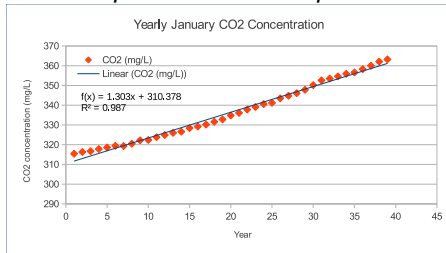
The fitting-line essentially provide a mathematical relationship of the form $y = f(x)$.

The simplest relationship is the Straight Line (or the linear model), i.e. $y = mx + c$.

Let us learn to fit data to obtain a functional relationship.

An example of a Line-Graph

Yearly January CO2 Concentration

$f(x) = 1.303x + 310.378$
$R^2 = 0.987$

- CO2 (mg/L)
- Linear (CO2 (mg/L))

Concluding Remarks

The session was an introduction to graphics using spreadsheet.

You may have learned that graphs are not only used for visual comparison but also to establish a relationship between data.

Not only linear, simple non-linear fit (e.g., exponential, power) can be done very easily in spreadsheet. Specialized software are required for more complication data fitting and trend analysis.

Most of the spreadsheet software provide capabilities of 3D visualization. You may want to explore them on your own.

Intermediate detail on spreadsheet can be found at wikipedia. You are suggested to explore the endless possibilities of spreadsheet.

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That all . . . ,

I hope that you have enjoyed.

Good luck with your exam.