**Understanding Data Visualization | Importance, Techniques, Tools & Software**

**Data Visualization – What is it and who uses it?**

**Data visualization** is a generic term used which describes any attempt to help understanding of data by providing visual representation. Visualization of data makes it much easier to analyses and understand the textual and numeric data. Apart from saving time, increased used of data for decision making further adds to the importance and need of data visualization.

Any sector which keeps a record is knowingly or unknowingly dealing with data based on which decisions are influenced. These can be related to sales, purchase or stock building. When the data available is very large it becomes impossible to make direct use of it. Large volume of data needs to be processed by various [data processing methods](https://planningtank.com/computer-applications/data-processing-data-processing-methods) to understand the collected data. Once the data is collected and processed it can be further simplified by use of charts, graphs, tables, maps etc. Pictorial or visual representation of text and numeric data in form of graphs and charts is what data visualization is all about.

Data visualization unlocks the potential to give your data a completely new meaning and revealing some hidden trends & information which otherwise would go unnoticed. All sectors ranging from education to research, advertising & marketing, all business setups, factories, banking sector, health care makes use of data extensively. In today’s scenario having access to right data is like sitting on a gold mine but unless you know how to use it effectively it remains unutilized or underutilized. Thus, understanding and realizing what is data visualization and knowing the data visualization techniques is essential for any person. This article will explain about data visualization definition, usage, importance, softwares, tools, techniques and examples.

**What makes data visualization extremely effective and useful?**

Understanding digits is difficult, interpretation of countless number is difficult unless it is presented in a meaningful way. This is where data visualization comes into play. It becomes easy to understand tables when they are represented pictorially by pie charts, line & bar graphs. Information hidden in numbers is clearly reflected and understood using charts and graphs. Human mind is unable to retain and comprehend much of factual data especially when it consists of numbers. Numbers needs to be formatted before any meaningful inferences can be drawn. Having raw data makes it impossible to understand the significance of data.

For example, a table showing sales for a product of last 10 years is provided. It will take time to read all the numbers, then compare sales of each year with the preceding year or some base year. This will then be done by comparing with every other year and if the data is simple then you will realize some pattern or trend. But in case the sales vary over the year then it will be very difficult to understand it. Now consider graph consisting of a line representing sales plotted against sales in over the year on one axis and sales on another axis. This line will just take seconds to reflect the sales. Doing this and any similar thing which provides a visual representation of data is data visualization.

Now consider more complex situation which involves data collected from decades on monthly or daily basis. All the reports and papers which you come across have used data visualization technique to convey their message effectively. Conveying your message in simplest form is achieved by means of data visualization. It saves everyone’s time and makes the information much easy to comprehend.

**Importance of data visualization**

Data visualization is important as it saves time required for reading long reports. It helps you in delivering much effective & crisp presentations thus saving everyone time and increasing productivity. Also, making changes to the charts and graphs is much easier as the data visualization softwares provides flexibility to convert one chart to another and make changes to specific data which needs to be modified. Some of the advantages which data visualization provides are:

* By designing data visualizations, you will get an idea which product to place where
* A data visualization tool can predict the sales, plot trends and thus help in decision making
* By using the best interactive data visualization software, it is quite easy to understand the factors that influence customers behavior
* A big data visualization tool also helps to understand the areas that need improvement
* Brings out the correlations and key details from data which often goes unnoticed
* By using data visualization, the data engineers or scientists can track their data sources and make an analysis report.

Having access to data is an added advantage over competitor but understanding the data accurately is what the real power is. Data visualizations tools enables you to use data in most efficient manner thus increasing productivity, profits and sales. At the same time, it helps in cost cutting, saving man hours and making the complete decision-making process fast.

**How data visualization works | What happens in backend when working with visualization softwares & tools**

Data visualization involves dealing with tons and tons of data which cannot be converted in visual form by humans directly. This requires use of softwares and tools, these can be simple tools serving multiple purpose such as done by Microsoft Word, Microsoft Excel, Microsoft Spreadsheet & PowerPoint. And almost every data visualization tools comes connected with a database software. What these data software do is, it pulls data from the database and creates a graphical image. These are not specialized and essentially data visualization softwares but widely used and serves the purpose well. Many of the users and organization which do not require highly specialized software make use of aforesaid softwares effectively and yields great results.

These software takes the data entered by a person or imported from a file and then assigns a visual characteristic to it. This can be done automatically based on the inbuilt features (these are highly effective) or as defined by the user. These softwares are extremely flexible and lets you take full control of how the data will be presented. This includes plotting the data sets as lines, bars, areas, circles, dots, pies, charts, tables, trend lines, geographically or even a combination of these!

Talking about more advanced & specialized data visualization tools, they provide a completely new insight to data. These softwares have the capability of automatically trying various permutation & combination with the data and provide you with most useful & relevant visual representation. These softwares can work with variety of data, have option to import the data sets from various sources and refine the reports themselves. Correlation and results provided by specialized softwares is unmatched. These saves time as the need of human intervention is minimized and the results improve over the time. These makes use of prevailing best practices in industry thus saving your time to conduct research about most effective visual form for your data.

**Data Visualization Techniques: Diagrams, charts, graphs.**

This section discusses a few data visualization techniques. This will help you understand the whole topic in a better way. But before we go further here are some of the tips that you need to keep in your mind:

* Before starting anything understand the data. Like its size how much effort it will take.
* Make sure you know what type of data you want to get.
* Keep the audience in your head and present the data the way your audience wants to get.
* Keep it simple and make everything visually appearing.

Most widely used forms of data visualization are presented below:

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| https://planningtank.com/wp-content/uploads/2016/05/Data-presentation-and-analysis-Pie-Chart.jpg | Pie Charts: Pie Charts are one of the common yet popular techniques. It also comes under data visualization techniques in excel. However, to some people, it can be hard to understand the chart while comparing to the line and bar type chart. |
| https://planningtank.com/wp-content/uploads/2016/05/Data-presentation-and-analysis-Line-Chart.jpg | Line Charts: To make your data simple and more appealing you can simply use the line charts technique. Line chart basically displays the relationship between two patterns. Also, it is one of the most used techniques worldwide. |
| https://planningtank.com/wp-content/uploads/2016/05/Data-presentation-and-analysis-Combo-Chart.jpg | Combo charts & Bar Charts: Bars charts are also one of the most commonly used techniques when it comes to comparing two different patterns. The bar charts can display the data in a horizontal way or in a vertical way. It all depends on your needs. |
| **Area chart** | Area Chart: An **area chart** or **area** graph is similar to a line chart but provides graphically quantitative data.  The areas can be filled with colors, hatch, pattern. This chart is generally used when comparing quantities which is depicted by area. |
| **heatmap** | Heatmap: This type of chart is widely used by websites, mobile application makers, research institutes etc. These maps shows the concentration of activity/ entity over a particular area. |
| **Network** | Network Diagrams: This is a powerful tool for finding out connections & correlations. It highlights and bridges the gaps. Shows how strongly one activity is connected to other. |
| **Scatter Plot** | Scattered 3 D plot: As the image shows it shows the distribution of entity in a 3-dimensional nature. It can be considered as showing location and concentration of gases in a box with different colors assigned to each gas. |
| **Treemap** | Tree Maps: These are used to displaying large amounts of hierarchically **structured** (tree-**structured**) data. Generally, size of each rectangle/ block refers to the quantity. |

**How data visualization is it being used:**

Data visualization can be helpful in many ways and just in case if you are wondering where it is being used. Then are some of the popular sectors:

* By using data visualization, it became easier for business owners to understand their large data in a simple format. The visualization method is also time saving so business does not have to spend much time to make a report or solve a query. They can easily do it in a less time and in a more appealing way.
* Visual analytics offers a story to the viewers. By using charts and graphs or images a person can easily exposure the whole concept. As well the viewers will be able to understand the whole thing in an easy way.
* The most complicated data will look easy when it gets through the process of visualization. Complicated data report gets converted into a simple format. And it helps people to understand the concept in an easy way.
* With the visualization process, it gets easier to the business owners to understand their product growth. Market competition in a better way. The visualization tools can be very helpful to monitor an email campaign. Or company’s own initiative regarding something

**Data Visualization Books:**

Well, there are many books that were written about this topic to give users a better idea. However, if you are planning to buy some books regarding the topic. Then you can check the following books:

* Storytelling with data: A data visualization guide for business professionals
* Data Visualization: A handbook for data driven design
* Data visualization a successful design process.

**Free & Paid data visualization software:**

Both free and paid tools and softwares for data visualization are available in the market. All these tools have specific advantage over the other as most of them cater to a specific or a few industries. You can choose from below mentioned tools or explore more and go ahead with the one which meets your requirements.

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| **Free tools & softwares** | **Paid tools & softwares** |
| Zoho Reports: Zoho Reports is one of the popular free data visualization software exist on the web. It lets you import data from web sources and make visualization of it. | Tableau: In Data visualization tableau is one of the most popular application. It offers a variety of visualizations that allows makes you understand what type of technique to use. In simple words, data visualization techniques using tableau is quite easy. |
| VIDI: The VIDI tool lets you create a visualization of your data for free. All you have to do is upload your data, select type, do a little customization and you are good to go. | Microsoft Excel: Yes, you can even use Microsoft Excel to visualize your data. You can know about the whole topic if you do some search about the data visualization tools excel. |
| Qlik Sense Desktop: The Qlick Sense desktop tool lets your interactive data reports visualization for free. | Microsoft PowerPoint: Just like the Microsoft Excel Microsoft PowerPoint is also one of the great tools to do the job. You can easily visualize your data Microsoft PowerPoint and so on |
| Microsoft BI Platform: The Microsoft BI platform allows you to update your data from different sources and makes a report out of it. | Fusion Charts: From the basic charts (line, column, pie etc. – 2D & 3D) to the most complex ones (waterfall, Gantt, candlestick, zoomline etc.). One of the most exhaustive collection of JavaScript charts, widgets & maps in the industry. |
| Google Fusion Tables: The google fusion tables is one of the simple tools to visualize the data. You can simply upload a file and choose how to display it. You can display your file as a map, table, line chart, or pie chart. It’s highly customizable and user friendly. | Data Wrapper: Known to have a simple, clear interface easy to work with. Provides option to upload csv data and create straightforward charts, and also maps, that can quickly be embedded into reports. |