

<b>THE ROLE OF VISUALIZATION IN UNDERSTANDING DATA</b>			<b>Computer Science</b>
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<b>Abstract</b>			
<p>The act of transforming data into a visual representation, such as a map or graph, to make it easier for the human brain to interpret and derive meaning from it is known as data visualization. The primary purpose of data visualization is to assist in the detection of patterns, trends, and outliers in large data sets. The terms “information graphics” and “statistical graphics” are commonly used interchangeably. Data visualization is a process in the field of data science that involves displaying data after it has been collected, processed, and modeled. The Data Presentation Architecture (DPA) discipline aims to search, locate, alter, prepare, and transport data in the most efficient way feasible.</p>			

**INTRODUCTION**

Almost every profession requires data visualization. Teachers can use data visualization to bring forward exam results, IT experts; on the other hand can use it for their own research. Visualization also has an important impact on Big Data. Companies sought a way to rapidly and easily gain a bird's-eye view of their data as they amassed vast quantities of data in the early years of the Big Data wave. They were well-suited to the visualization tools.

For similar reasons, visualization is essential in advanced analytics.

When a data scientist creates predictive analytics or machine learning algorithms, it's critical to visualize the findings to confirm that the models perform as planned. This is because sophisticated algorithm visuals are often easier to understand than digital outputs.

Data visualization is a quick and effective technique to express information using visual data in a universal fashion. This practice can also assist businesses in identifying factors that influence customer behavior, identifying areas that require improvement or additional attention, making data more memorable for stakeholders, determining when and where specific products should be placed, and forecasting sales volumes.

**THE BENEFITS**

- the ability to quickly absorb information, improve knowledge and faster decision making a better understanding of the next steps that need to be taken to improve the organization;
- better ability to maintain audience interest with information they can understand;

- easy dissemination of information that increases the possibility of sharing knowledge with all concerned;
- eliminate the need for data specialists since data is more accessible and understandable;
- an increased ability to act quickly on results and therefore achieve success with greater speed and fewer errors.

With the rise in popularity of big data and data analytics, visualization is now more vital than ever. Machine learning is rapidly being used by businesses to collect huge amounts of data that are difficult to filter, comprehend, and explain. Visualization can help speed up this process and provide information in a way that business owners and stakeholders can understand.

## SEEING IS UNDERSTANDING

Big data visualization frequently goes beyond traditional visualization approaches like pie charts, bar charts, and business graphs. Heatmaps, for example, are used instead of more complicated representations.

Even though big data visualization can be advantageous, it can also have a number of problems for businesses, including:

- Hiring a visualization professional is required to get the most out of large data visualization techniques. To guarantee that organizations get the most out of their data, this professional should be able to pick the finest datasets and visualization methods.

- Because data visualization necessitates powerful processing hardware, efficient storage systems, and even a shift to the cloud, large data visualization projects frequently involve IT teams as well as management.

- The big data visualization's information will only be accurate if it matches the information represented. As a result, people and processes to oversee and control the quality of enterprise data, metadata, and data sources are critical.

## EXAMPLES

**Line graphs:** Are one of the most basic and common techniques for visualizing data. Line graphs show how variables can change over time.

**Area charts:** This visualization style is similar to a line chart in that it shows numerous values in a time series, which is a collection of data collected at different points in time.

**Scatter plots:** This method demonstrates the connection between two variables. The data points are represented by dots on an x and y axis in a scatter plot.

**Trees:** This method uses a nested format to convey hierarchical data. The size of each category's rectangle is proportionate to its percentage of the total. When comparing distinct components of a whole, trees are the greatest tool.

**Population pyramids:** This technique uses a stacked bar chart to display the complex social narrative of a population.

## USAGE

**Sales and marketing:** According to a study undertaken by the media company Magna, by 2020, 50% of all global advertising expenditures will be spent online. As a result, marketing departments must be exceedingly attentive about the sources of their web traffic and how their web assets generate revenue. Data visualization makes it easier to monitor traffic trends over time as a result of marketing actions.

**Politics:** A geographic map that shows which party people voted for is a common example of data visualization in politics.

**Healthcare:** A choropleth map shows split geographic areas or regions that have been colored according to a number variable. Professionals can use choropleth maps to see how a variable, such as the death rate from heart disease, changes over time in certain areas

**Scientists:** Because of scientific visualization, often known as SciVis, researchers and scientists are now better in understanding experimental data than ever before

**Finance:** When deciding whether to buy or sell an asset, finance professionals should be able to track the performance of their investment. Trading charts are used to monitor price fluctuations over time and present essential information such as stocks, derivatives, securities, currencies, raw materials, and bonds. Data analysts and financial professionals can discover trends by examining price fluctuations over time.

**Logistic:** Visualization technologies can be used by shipping lines to discover the optimum worldwide shipping routes

**Researchers:** Trading charts are used to track price changes over time and display important data about securities, derivatives, currencies, stocks, bonds, and raw materials. Trends can be discovered by looking at price swings over time, which data analysts and financial professionals can do.

## CONCLUSION

Data visualization software can be applied in a variety of ways. The most prevalent application today is as a reporting tool for corporate intelligence. Users can use visualization technologies to create automatic dashboards that track and graphically interpret business performance based on key performance indicators (KPIs).

Interactive features may be included in the images generated, allowing users to edit them or inspect the data more carefully in order to query and analyze it. Indicators can be used to notify users when data has been updated or when specific requirements are met.

To track their own initiatives, several company departments use data visualization tools. A marketing team, for example, might use software to track metrics like open rate, click-through rate, and conversion rate in order to monitor the performance of an email campaign.

Data visualization companies are increasingly using these products as front ends for more sophisticated and larger data environments as their functionality grows. Data visualization software aids engineers and scientists in tracking data sources and doing basic exploratory analysis of datasets prior to or after sophisticated investigations.

Microsoft, IBM, SAP, and SAS are the most well-known names in the data tools sector.

Tableau, Qlik, and Tibco are some of the most well-known names in this sector for specialist big data visualization tools.

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