



Data Visualization in Business Analytics

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Abstract. Data visualization is a very important part of business intelligence and data analytics. Data visualization tools and libraries are a collection of data visualization tools, libraries, and tools that are available for use in business intelligence, data analytics, and business intelligence. These tools are available in a variety of formats, formats, and formats. In this paper, we will focus on the most common types of visualizations you encounter in data analytics in general.

1. Introduction

The process of transforming unformatted information (text, numbers, or symbols) into a graphic representation is known as data visualisation. The data is represented with a specific goal in mind: to describe inclinations, trends, and patterns as well as to demonstrate logical links between units. The format of visualisation might vary depending on the logical relationship and the data being shown. Therefore, it is ridiculously straightforward; each analytical report includes instances of data interpretations such as pie charts, comparison bars, demographic maps,

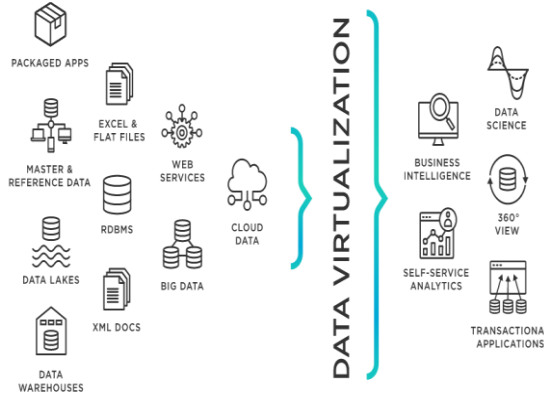


Figure 1

Visuals are often made manually using the appropriate tools, such as PowerPoint or Photoshop. However, analytics continue to be its primary area of use. Due to this, data visualisation, also known as dataviz, became the norm for presenting information to consumers through the BI interface (data representation tool).

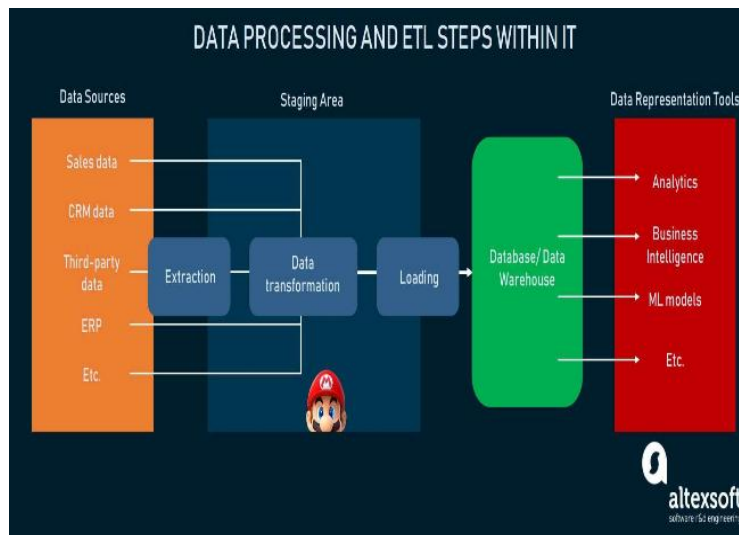


Figure 2

2. How does BI visualise data?

A data representation tool is just the user interface of the entire business intelligence system, as we have already explained. The data undergoes a protracted procedure before it can be utilised to produce images. We'll divide this down into the steps since it basically describes how BI functions: Defining the data sources and types that will be used should come first. Then, transformation strategies and database attributes are chosen. The data is then obtained from its originating repositories, such as Google Analytics, ERP, CRM, or SCM systems. The data is transported to a staging location through API channels, where it is modified. Data cleansing, mapping, and standardisation to a single format are presupposed throughout transformation. Consequently, you can now identify where data visualisation genuinely fits into the whole process. There are several options available for selecting how to use data for graphics in the majority of contemporary BI applications. There is often a command dashboard with a drag-and-drop user interface that enables you to: Through API, link the data source to the system (or custom integration) Select the dataset to use.

- Selecting a visualisation style
- Put a variety of images on the dashboard.
- To alter the data, create interactive components.

visuals as the data is updated

- manually entering data
- report saving
- report sharing

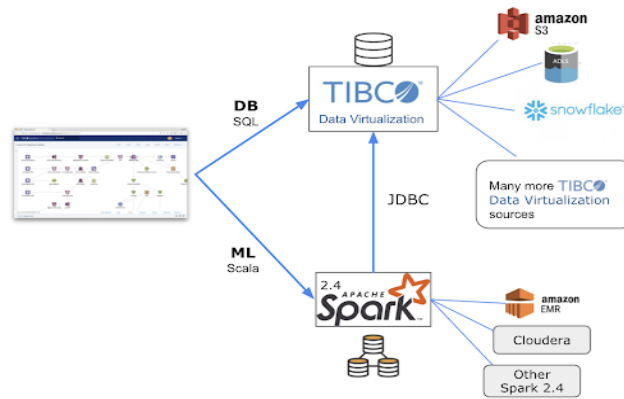


Figure 3

The user has complete freedom to work within the built-in visual template sandbox after selecting the source. These templates can be utilised alone or along with the dashboard after being filled out with the necessary data. There is no need to manually produce the graphics even though the visualisation process isn't entirely automatic. Templates are typically available for usage in all BI interfaces. These may be changed and amended by establishing the necessary data characteristics. In some circumstances, graphics can automatically alter graphs and tables to reflect changes in the data and exhibit these changes. Data visualisation libraries are essentially used to do this. This subject is covered in more detail below. Now, though, let's talk about the kinds of images that.

3. Common data visualisation formats

It is not an objective to visualise information. The data is more understandable on a higher level when it is visualised, which is why we explain concepts like quarters or percent as pieces of the pie. However, a visual is a tool to explain the connections between various units on a more fundamental level. The graph on the wall tells the story of it all, as Depeche Mode sung in their song "Everything Counts." Indeed, the story is told through data interpretation, and visuals are used to do so. Depeche Mode, I'm grateful! Each type of visual is specifically correlated to the notion of what data it can interpret and what kind of connection (relationship, comparison, composition, or distribution) it best illustrates.

Bar chart:

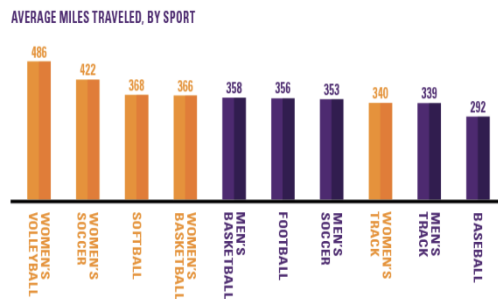


Figure 1 Bar chart

Because of their adaptability, bar charts may be adapted to display increasingly intricate data models. The bars can be stacked or arranged in clusters to show dispersion across market segments or product subcategories. The same is true for horizontal bar charts, which suit the placement of lengthy data labels better on the bars.

Pie chart: Any marketing or sales department will use this sort of chart since it makes it simple to show how items are put together or how they compare one to another. When to use: analysing an object's composition, evaluating how well the elements fit together.

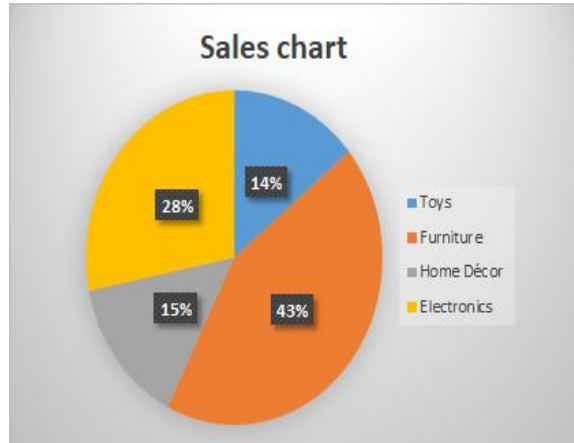


Figure 4 Pie chart

Line graph: To show data from many dimensions, line graphs may also be used in conjunction with bar charts. Use when: An object's value on a timeline showing trends in behaviour over time.

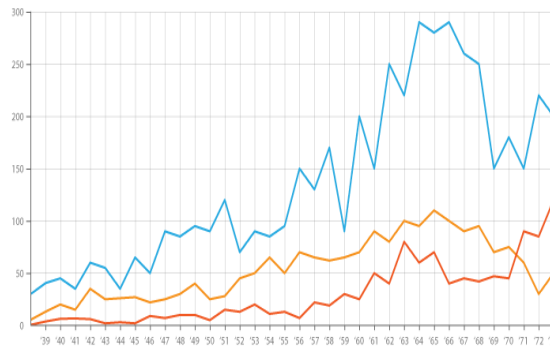


Figure 5 Line graph

Box plot: Outliers are displayed as objects that fall outside of the distribution region in a box plot that is divided into five quartiles. The lowest, maximum, and the median—located in the middle of the first and third quartiles—are the major components of this analysis. The distribution of items and their variance from the median are displayed in a box. When to utilise it: complicated object distribution, departure from the median.

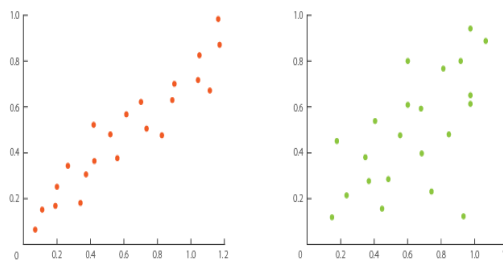


Figure 4 Scatter plot

Scatter plot: On X and Y axes, this form of representation is constructed. They are separated by dots that serve as object definitions. A dot's location on the graph indicates what characteristics it possesses. Similar to line graphs, dots put between

the axes are quickly observed. The number of axes is the sole restriction on this kind of representation. When to use: determining the quality of each object on the graph, displaying the distribution of objects.

Funnel charts: These are excellent for illustrating decreasing relationships between several groupings of items. Most of the time, to distinguish goods, funnels will use both geometric shape and colour coding. A catalogue that describes each form of graph, chart, map, or table is available if you wish to go deep into data visualisation types. Ensure that you fully comprehend the following considerations before selecting the style of visualisation: Particulars of your data set: specialised field or organisational division. Audience: the individuals to whom you wish to convey the information Connection logic: object comparison, distribution, relationship, process description, etc. Output: Clearly, the justification for sharing this information with someone. The tools you may use to produce data visualisation will now be covered.

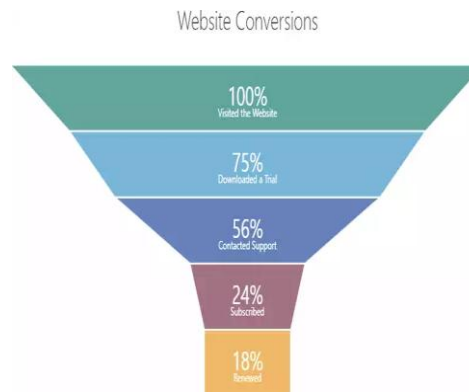


Figure 5 Funnel charts

4. Tools and resources for data visualisation

The market for data visualisation has a wide variety of products. Look for a scalable BI service that will suit the size of your company and your analytical requirements when selecting a vendor. Even though the capabilities are fairly comparable, the ecosystems that each vendor is providing may or may not include crucial services. This section will discuss provider options as well as the tools needed to build custom visualisation software. Additionally, keep in mind that the majority of tools are paid or freemium due to the sophisticated analytical techniques, supporting infrastructure, and explicit functionality. Desktop programmes are very large programmes in and of themselves. You run the risk of damaging your computer by using them without the most recent hardware.

Popular tools for data visualisation: Most often, data visualisation tooling takes the form of a desktop application that is represented by a command dashboard. Datasets will be automatically uploaded because the API is used to integrate with data sources. Following your designation of the location of your data, the application will offer you a canvas for the upcoming report on which you can arrange visualisations and populate them with data. The settings for data properties and correlation types vary for each visualisation template. Therefore, you will be able to create the report by combining various visual types. Depending on the functionality, reports can be shared internally with other users or further exported as CSV files. Data visualisation companies provide comparable services, as is the case in any technology market.

Lookers a platform for data analytics that allows connections to SQL and web-based data sources. Features of a looker:

- User interface with drag and drop
- Configurable dashboards
- Downloadable reports
- Using third-party sources with API integration
- Database data retrievalAccess

Zoho Analytics from any platform. A component of the Zoho analytical platform is this business intelligence tool. For useful, focused insights, Zoho services are segmented by department on the solutions page. Features of Zoho

- User interface with drag and drop
- internet resource
- Including integration of several data sources (Google products by default)
- API support and SQL data queryembedding of a report Shareable access to analytics Tableau.
- This supplier is qualified.

Tools for displaying data for free:There aren't many options that are completely free available. You can upgrade to some paid features or product(s) in one way or another. Having said that, here are some companies you can test out to learn how to work with data visualization: Power BI from Microsoft Free software from Microsoft is not unusual, but there are some drawbacks. The Microsoft Gallery will be made available to view all the produced reports, but you can get full functionality without spending a dime. In essence, the public will be able to see all of your reports. Features of Power BI

- Desktop application with a drag-and-drop interface
- numerous native data source integrations

- Individualized reports
- incremental updates to the data
- Power offers the complete BI ecosystem as a service.

Open-source tools, packages, and libraries for data visualisation. The creation of particular types of graphics can also be done using various technologies. Most of them require knowledge of programming languages (and sometimes frameworks as well). D3.JS is a free JavaScript library for building visuals by using the document object model's API to link data with it and manipulate documents as objects. An open-source, free JavaScript library called Digraphs can be used to create data visualisations in web browsers. For creating interactive charts and graphs, it can be used with large datasets. Check the documentation for data formats and API references first. Another JavaScript-based tool, Chartist.js, is used to create graphs and charts and style them with CSS. The Python package Gleam is used to create scatter plot visualizations. With CSS and HTML's assistance. For making charts in their most basic forms and saving them as SVG files to be shared further, use the Python library Leather. Another open-source Python library designed to produce 2D visualisations is Matplotlib. All of the aforementioned libraries and tools are open-source and can be freely used along with current software to develop new kinds of data visuals.

Problems with data visualisation: You must educate yourself on the possible drawbacks of graphics before deciding to include them to your analytics. It's not a huge issue to use the tools. In general, even ecosystem-scale products are rather simple to use. However, before the real data can be shown, there are several ramifications to be aware of if you're a manager or in charge of deploying BI in your company. The most frequent problems in data analytics are broken down below per domain. Preparing data presents difficulties. The primary error during dataset preparation is failing to make the appropriate assumptions. Determining the necessary data and practical sources is dependent on assumption, just like during any other step in software development. The choice of whether to use a data set is similar. Testing at each step of the data processing process might lead to the discovery of a straightforward answer. When it comes to data visualisation, we must test the presumptions that will have a direct influence on the visualisation procedure. What they are is: First data types, Selected sources varieties of data sourcing (querying, constant updating, ad hoc reporting) The design of your database or data warehouse An ETL developer that is a subject matter expert in that area can test all of these structural components, and assumptions may be reviewed with data engineers and analysts.

Obstacles to the visualising process: A less amount of technology is used at the visualisation stage. Although some business intelligence tools are semi-AI driven, the user is still in charge of selecting the visualisation format and data attributes that will be shown on a canvas. Thus, it implies: Using the incorrect visualisation format is the first pitfall. Studying the minimal amount of dataviz needed for your organisation will take some time because it's quite simple to become lost in the jungle of graphs, charts, and maps. Everyone will be baffled by, for instance, the use of a spider chart when there is only one attribute to compare for the object. Furthermore, the opposite is true: An use of a line graph to compare multiple units, such as seasonal sales across three nations, Using incorrect data is the second pitfall. A very similar problem, but it takes a few tries to figure out what kind of data can be used with your tried-and-true dataviz. Pitfall 3: You produce reports, not dataviz tools. It might come as a shock to you, but as things stand only a select few extremely expensive tools can interpret a portion of the data for you. Correct tooling selection is the fourth pitfall. Well, maybe it can't be wrong for you if you decide to mess around with a library or a free tool. But things become more serious when we discuss the vendor selection. Vendors of data visualisation offer the whole service to make your life easier as the one who will use the reports. Understanding if the service is scalable—that is, whether it can handle the volume of data you have and the frequency of its updates—is the key here. Since industry-specific analytics may employ unusual types of dataviz, it is also important to take visualisation skills into account.

5. Conclusion

Analytical and business intelligence applications for data virtualization were discussed in this article. This was only a quick summary of the basic concept and examples of typical applications. Data virtualization may be done in a variety of ways using technology that is far more advanced. Data virtualization, in my opinion, will become a standard feature in the majority of BIA systems because to the benefits associated with it and the rapid advancements in technology. Additionally, it could be a crucial piece of technology for some particular use cases in the future, such process mining in the Internet of Things. However, despite the amazing approaches to fully virtualized data warehouses, I believe there are still certain challenges to be addressed before we see fully virtualized settings, especially in the cloud.

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