Data Visualization

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Agenda

- Data visualization
  - What? Why?
  - Benefits
  - Techniques
  - Who uses it?
  - Challenges

Data Visualization

- Data visualization is the presentation of data in a pictorial or graphical format.
- It enables decision makers to see analytics presented visually, so they can grasp difficult concepts or identify new patterns.
- With interactive visualization, you can take the concept a step further by using technology to drill down into charts and graphs for more detail, interactively changing what data you see and how it's processed.

Data Visualization

- With so much information being collected through data analysis in the business world today, we must have a way to paint a picture of that data so we can interpret it.
- Data visualization gives us a clear idea of what the information means by giving it visual context through maps or graphs.
- This makes the data more natural for the human mind to comprehend and therefore makes it easier to identify trends, patterns, and outliers within large data sets.

Benefits of Data Visualization

- **Correlations in Relationships:** Without data visualization, it is challenging to identify the correlations between the relationship of independent variables. By making sense of those independent variables, we can make better business decisions.
- **Trends Over Time:** While this seems like an obvious use of data visualization, it is also one of the most valuable applications. It's impossible to make predictions without having the necessary information from the past and present. Trends over time tell us where we were and where we can potentially go.
- **Frequency:** Closely related to trends over time is frequency. By examining the rate, or how often, customers purchase and when they buy gives us a better feel for how potential new customers might act and react to different marketing and customer acquisition strategies.

Benefits of Data Visualization

- **Examining the Market:** Data visualization takes the information from different markets to give you insights into which audiences to focus your attention on and which ones to stay away from. We get a clearer picture of the opportunities within those markets by displaying this data on various charts and graphs.
- **Risk and Reward:** Looking at value and risk metrics requires expertise because, without data visualization, we must interpret complicated spreadsheets and numbers. Once information is visualized, we can then pinpoint areas that may or may not require action.
- **Reacting to the Market:** The ability to obtain information quickly and easily with data displayed clearly on a functional dashboard allows businesses to act and respond to findings swiftly and helps to avoid making mistakes.

Data Visualization Techniques

- **Infographics:** Unlike a single data visualization, infographics take an extensive collection of information and gives you a comprehensive visual representation. An infographic is excellent for exploring complex and highly-subjective topics.
- **Heatmap Visualization:** This method uses a graph with numerical data points highlighted in light or warm colors to indicate whether the data is a high-value or a low-value point. Psychologically, this data visualization method helps the viewer to identify the information because studies have shown that humans interpret colors much better than numbers and letters.

Data Visualization Techniques

- **Fever Charts:** A fever chart shows changing data over a period of time. As a marketing tool, we could take the performance from the previous year and compare that to the prior year to get an accurate projection of next year. This can help decision-makers easily interpret wide and varying data sources.
- **Area Chart (or Graph):** Area charts are excellent for visualizing the data's time-series relationship. Whether you're looking at the earnings for individual departments on a month to month basis or the popularity of a product since the 1980s, area charts can visualize this relationship.
- **Histogram:** Rather than looking at the trends over time, histograms are measuring frequencies instead. These graphs show the distribution of numerical data using an automated data visualization formula to display a range of values that can be easily interpreted.

Who uses Data Visualization?

- Data visualization is used across all industries to increase sales with existing customers and target new markets and demographics for potential customers.
- The World Advertising and Research Center (WARC) predicts that in 2020 half of the world's advertising dollars will be spent online, which means companies everywhere have discovered the importance of web data.
- As a crucial step in data analytics, data visualization gives companies critical insights into untapped information and messages that would otherwise be lost.
- The days of scouring through thousands of rows of spreadsheets are over, as now we have a visual summary of data to identify trends and patterns.

Challenges

- Data visualization has changed our society considerably. From the most simple projected line across a football field through to complex graphs outlining market fluctuations, they are changing the way that our society is approaching and understanding data.
  - VR
  - AR
  - Development. ...
  - Differing Levels Of Understanding. ...
  - Technical Skills.

Virtual Reality

- Virtual reality is going to have a huge impact on the potential for data visualizations, allowing people to interact with data in the third dimension for the first time.
- Imagine being able to pick a data set and move it around on any axis to compare it to another, it isn’t too far away.
- According to SAS we can process only 1 kilobit of information per second on a flat screen, which can be increased significantly if it’s analyzed in a 3D VR world.

Virtual Reality

- Virtual reality is something that is currently seen as predominantly for entertainment so trying to get a senior leader in a fortune 500 company to wear one to look at sales data would certainly be a struggle.
- At present there are some moves to try and make VR headsets more compact, but this is going to take several years and data visualization needs to stay front and centre until then.

Augmented Reality

- Augmented reality may well be the single biggest change that we are going to see regarding the use of data visualizations.
- To some extent we have seen some of it already, with HUDs like the now defunct Google Glass, overlaying data onto what you can see in front of you.
- Bizarrely, one of the key reasons for the sudden concentration on AR is the huge success of Pokemon Go, which not only showed the capabilities of AR, but also introduced it to a wide and diverse audience.

Augmented Reality

- The challenge that data visualization is going to have is that those creating them need to make sure they are doing so in an understandable and non-obtrusive way.
- It creates a new dynamic, where the data overlaid needs to be clear, concise and not distracting.
- It’s a fine line to balance on and a real challenge for those who are used to creating traditional visualizations.

Developement

- VR and AR are likely to be interesting technologies in the future, but for the time being, we are still going to be consuming the majority of our data through traditional 2D screens.
- As the number of data visualizations increases in almost every area, the chances of yours standing out decreases too as you’re trying to get to the top of a larger and larger pile.

Developement

- It means that whilst these other technologies are developing, people working in data visualization need to try and find a way of making their visualizations stand out from the crowd, without making it overly complex.
- This could mean more vivid colors, increased interactivity or simply using the most interesting data, but finding the correct way is certainly a hurdle to overcome in the next few years.

Differing level of understanding

- As data has spread throughout society one of the elements that has become evident is that there is a huge variation in the levels of understanding.
- This could even be in a high powered business setting, where people who are used to seeing basic excel graphs do not understand anything more complex.
- The idea of interactivity within visualized data is not something they would ever feel necessary.
- However, there are others who would benefit from more complex visualizations, where they can see as much as possible in as smaller space as they can, through interactive design or just more complex features.

Differing level of understanding

- It is, therefore, difficult for those designing visualizations to match up to the wide-ranging understanding of data and data visualizations.
- It could be that multiple visualizations are created for different levels of data literacy, but that’s simply wasting resources and is hardly a practical solution.

Technical Skills

- As we move toward more interactive and complex trends for data visualizations, we are going to be seeing an increased need for technical skills to first understand and translate the data then create visualizations around the results.
- We already have a shortage of data scientists and people who can feed the right data to the right people, so this is going to be a key challenge for the creation of decent data visualizations that can pinpoint important data.
- Although this is likely to increase in the future with an increasing number of universities offering data science courses, this is unlikely to see data scientists becoming prevalent for several years.

Technical Skills

- As discussed previously with VR and AR, working on new technologies is not easy, especially for those with little experience of similar areas.
- At the same time, these technologies are not developing for data visualization alone, with those with the training and qualifications having the option of working on other popular mediums, like gaming or movies, which may also have higher salaries given the focus of the technologies on these markets.
- Therefore, trying to find somebody with the technical expertise who hasn't already joined these other industries is going to be a huge hurdle to overcome.

Thank you

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