



Thought Leadership INSIGHT CREATES VALUE
Leadership éclairé LA PERSPICACITÉ CONFÈRE DE LA VALEUR.

Translating Numbers into Visualization

Sunder Gee, CPA, CMA, CIDA

General Overview

Data visualization is the presentation of data or information in a visual context using a graphical or pictorial format. Visual data allows for quicker understanding of data and may expose patterns or outliers that might be overlooked in numerical or text based displays.

Modern data visualization tools display data in advanced formats such as dashboards, maps, charts and graphs that go well beyond those visuals provided by spreadsheets. Some tools allow users to interactively query and drill down into the underlying detailed data.

Organizations use data to tell stories to help achieve their objectives. Story telling is based on data but leveraged with visuals to simplify and further the understanding in order to communicate with the audience. Parietal art or cave paintings which existed over 30,000 years ago are believed to have been used for visual communication. Today, our written communication methods have emoji attached to emails or text messages.

Requirements

Data visualization results can only be as good as the data and the analytics behind the visualizations. On the back end, the tool need to be able to access data from various sources and formats. The tool should be able to handle a wide range of data from simple data stored in Excel spreadsheets to complex ERP data and cloud data. It also requires a strong analytical process that has features such as summarization, gap detection, duplicate detection with fuzzy matching, field manipulation, stratification and built in advanced statistical methods. Keep in mind that the dashboard or visualization users sees only the summarized data results and may not be aware of the back end preparation such as cleansing, normalizing and verifying data integrity from potentially multiple platforms and sources before analytic can even start. For the summarized visual results to be relevant and current, the detailed data must be kept updated and processed again.

The front end visualization tool should be able to present the data in simple to understand format, manipulate or drill down to details, and automatically update the visuals when the data changes. The tool should make large data sets coherent. There are numerous ways to view data. Those that can display visuals in an intuitive way to understand the story being told would be the superior tool. Readers should be aware that data visualization is not data analytics!

Visualization and Data Analytic Software

Tableau software is a recognized leader in data visualization that makes providing superior visual outputs easy. Refer to Figure 1 as an example of the 2015 parking fines in the City of Toronto from the recent version 10 software.



Figure 1
Source: Tableau Software

The powerhouses of data analytic software, being IDEA, ACL and Arbutus that are extremely robust in doing analytics all happen to be Canadian companies. Tableau can import data from all of these software. Some data analytic software such as IDEA features visualization in addition to its powerful data analytics. There is even an option to automatically create the dashboard contents for you. Clicking on areas of the dashboard would drill down and display the underlying detailed data. Figure 2 shows 2008-2015 Toronto parking fines from the new version 10.2 software that is constantly evolving, especially in the visualization area.

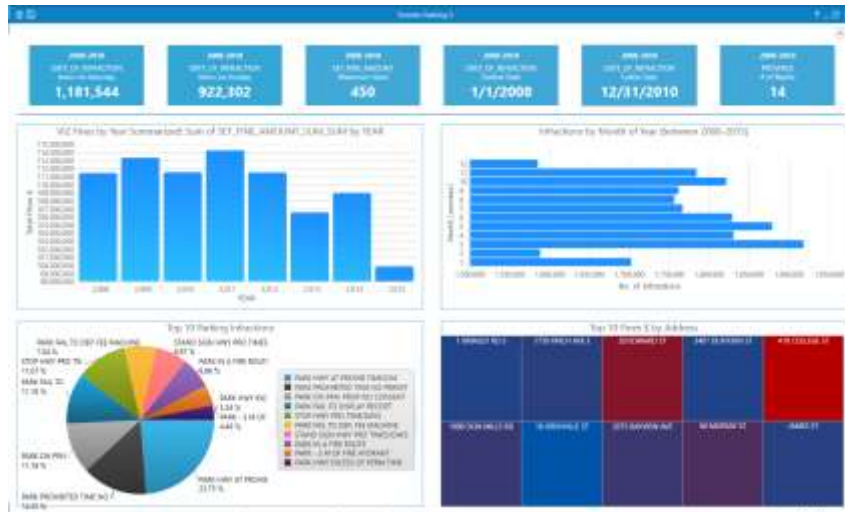


Figure 2
Source: CaseWare IDEA Inc.

Visualization of data is not restricted to the domain of numbers but can also be applied to information. A Montreal company, JLR.CA, has built a beta version of their IntelChamp software which can take information, automatically eliminate most duplicates and then link the relationships and provide the output in seconds. Figure 3 shows the visual linkage of sample data output from a Corporation Registry database.

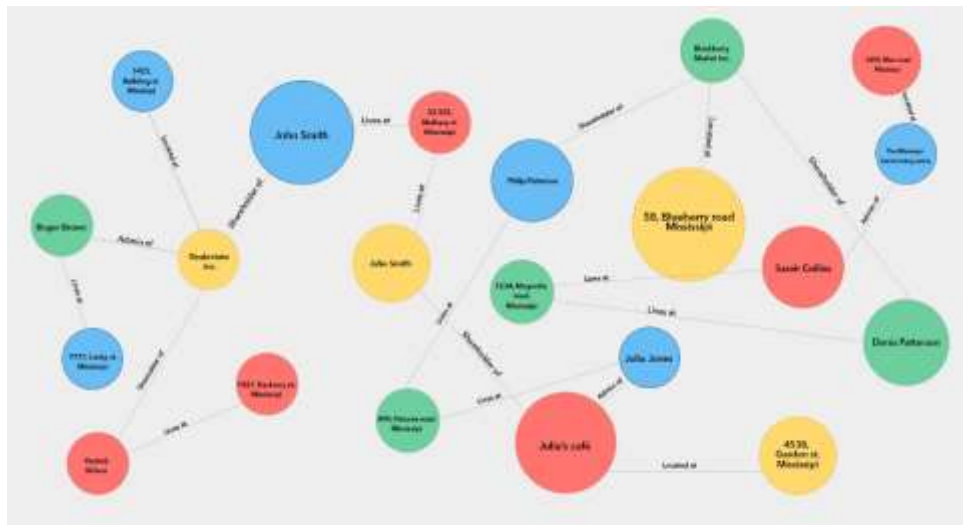


Figure 3
Source: JLR.CA

Visualization for the Internal Auditor

Internal auditors are large users of data analytic software. Adding the visualization tool that sits on top of the data sets allows the auditor to quickly realize insights. Visualization can help focus the fine details into several levels of broader overviews. This is especially important for internal audit reporting. The visualizations not only highlight the negatives but may be able to tell stories of good practices. Visualization aids in showing management that recommendations for improving processes are factually based and contextually relevant as the data displayed originated from within the business.

Users of visualizations should be cognizant that there is a potential that the visualization tells the wrong story. The display may imply an incorrect conclusion by distorting what the data represents or promote “visualization apophenia”. Apophenia is the tendency to perceive a connection or meaningful pattern between unrelated or random information. These potential false positives need to be considered with care. On the other hand, certain issues require follow up as they may not be false positives. What would be the consequences if the auditor spots an anomaly, does not investigate, and the anomaly is subsequently revealed as a significant control violation or an occupational fraud issue?

Visualization tools may be wonderful for auditors who are visual learners but what about the audio and kinesthetic learners. Research shows that 60% of individuals learn best with visual or mixed cues, 25% better retain information after hearing it and 15% learn best with the hands on approach.¹ We should not exclude 40% of the population by over focusing on visualization as they may be overwhelmed with the complexity of the graphics.

Visualization of the Future

Data visualization software should know not just “how” to present the data, but also “what” data to present. The next generation of software need to incorporate artificial intelligence.

Intelligent visualization software should elevate the software to do the work of analyzing and preprocessing the data for its users so that skilled auditors can spend more of their time investigating discrepancies.

Mindbridge.ai, an Ottawa base company, has developed a product to help auditors know where to start. The system provides a risk-score for all data, highlighting the highest risk items that require the most attention. The platform uses polymorphic

¹ Walter B. Barbe and Michael N. Milone, Jr., “What We Know About Modality Strengths”, EBSCO Publishing

patterns detection and deep learning neural networks to self-generate a risk score searching for materiality and allowing auto-assignment of tasks. Figure 4 shows a visualization result from a financial audit step. The centre box on the right side of the diagram was intentionally pixelated for privacy reasons.

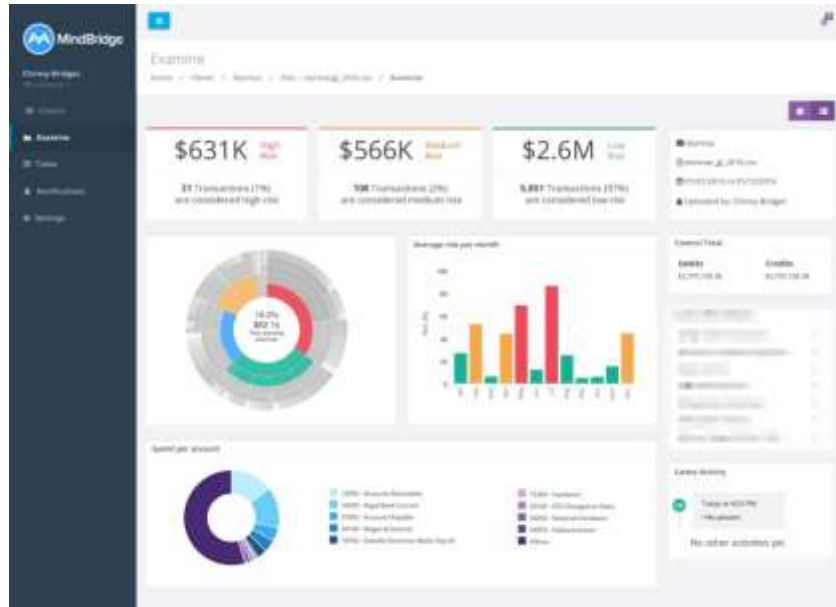


Figure 4
Source: MindBridge Analytics Inc.

MindBridge dynamically learns from the auditors' behaviour on the platform and creates artificial intelligent bots that continuously adapt and assist the users at each step of their process.

The system automatically generates supportive visualizations and recommend next steps to continue the analytics for the data.

Intelligent visualizations may provide maximum insights to every auditor.

Conclusion

There is a need to manage the data generated by businesses, Internet activities and other data capturing devices. It is critical that the analysis is performed correctly with the right data analytic tool. Results of analyses need firstly to be viewed at a higher summarized level.

Usage of data visualization tools can be very effective if visualizations are kept simple so that they are easily digested. An accompanying narrative that clarifies the

displays, interprets the data and provides context to the visualization in relation to the business operations would be a powerful tool to stimulate and engage most viewers.

Visualization is exceptional for presentations and storytelling, but is also valuable to the auditor to better understand the significance of data that is being worked with. It also provides another opportunity to detect trends and correlations that might be more difficult to otherwise spot.

Visualization is another well needed tool that when used correctly adds value to the auditors' efficiency and effectiveness.

Sunder Gee is a data analytic specialist and author of *Fraud and Fraud Detection: A Data Analytics Approach*. He can be contacted at sunder.gee@zapconsulting.ca.