See the Possibilities with Data Visualization
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Quickly Visualize Data on Mobile Devices and the Web

Today, all organizations – regardless of their size – are inundated with data. It pours in from every conceivable direction: from operational and transactional systems, from scanning and facilities management systems, from inbound and outbound customer contact points, from mobile media and the Web. It is structured and unstructured; it is messy and overwhelming, flowing in at greater speeds than ever.

The optimist’s vision for this tidal wave of data is that organizations will be able to harvest and harness every relevant byte of it to make supremely informed decisions.

Unfortunately, IT teams can’t keep up. Ever-growing requests for data, ad hoc analyses and one-off reports – combined with insufficient IT resources – make it difficult to address all information requirements in a timely manner. Decision makers struggle because it takes hours or days to get answers to questions, if at all. To be effective, users need and expect self-service access to information in a form they can easily understand and share with others.

“Data presents many challenges,” said Justin Choy, Global Product Manager for Business Intelligence Solutions at SAS. “One big problem is the time it takes to aggregate all the data. To get around this problem and improve performance, IT has to create summaries of the data or a cube with predefined hierarchies.”

Creating a summary or a cube of data can help users look at it quickly. But if the users need to look at the data in a different way than the summary or the cube provides, they usually have to turn to a data administrator or someone else in IT to access another view. This takes time, which in turn delays the analysis. In addition, some business questions are best answered by using all available and relevant data – but that can place too much of a strain on IT resources to process within the decision window.

This is where in-memory analytics and data visualization techniques apply. With in-memory analytics, data is read into memory and analytic processes are quickly distributed into easily manageable pieces for fast processing. The result? Blazing-fast insights on all the data, without the need for subsetting or sampling. Data visualization enables users to quickly and easily explore their data for hidden trends and discover new opportunities. “Data visualization is shaking up the world of analytics, changing the way you work with data,” said Jennifer Marchi of SAS Business Intelligence Product Marketing. “You can find insights from your data faster than ever and be able to share those insights with others.”
Introducing SAS® Visual Analytics

SAS® Visual Analytics combines an easy-to-use, dynamic interface with powerful in-memory technology to enable all types of users to visually explore data, execute analytic correlations on any size of data within minutes or seconds, understand what the data means and deliver the results quickly wherever needed via Web reports and mobile devices. Designed for all types of users – from decision makers and analysts to statisticians and data scientists – the solution keeps IT in charge of data integrity and security while enabling business users to communicate results via dashboards and KPIs.

SAS Visual Analytics goes well beyond traditional query and reporting to provide easy-to-use predictive analytics. Analysts can now apply sophisticated analytic techniques, not just simple calculations, to generate descriptive and predictive insights from their data. And a dynamic, visual interface makes the solution easy to use – putting this power into the hands of a broad range of users.

Running on low-cost, industry-standard blade servers, SAS Visual Analytics delivers answers in seconds or minutes instead of hours or days. This kind of processing speed enables analysts to use complete data sets instead of sample subsets – so they can quickly find important insights that were not evident before.

For example, marketing campaign optimizations that previously took eight to 10 hours or more can now run in less than three minutes. Bank risk calculations that once took 18 hours can now be completed in 15 minutes.

Access to lightning-fast in-memory processing and sophisticated analytics completely redefines what’s possible.

Retailers, looking for ways to optimize the offers and promotions they make to customers, can now include all their data – from online sales, stores and social media, plus demographic information and other purchased market data – to determine “next best offer” recommendations with greater accuracy and certainty. No longer limited to a subset of customers, now retailers can get on-target recommendations for entire populations quickly and easily.

Banks can enhance their credit default risk models. With SAS Visual Analytics embedded in the analytics life cycle, analysts can look at more data – more often and more quickly – for new insights to design better models that can quickly adapt to address new and emerging patterns of fraud.

What Makes SAS® Visual Analytics Special?

SAS Visual Analytics makes powerful analytics easy, so even nontechnical users can understand how all your data adds up. You can apply predictive and descriptive analytics to any size data in just minutes or seconds to spot previously unknown patterns, identify key relationships and uncover insights that would otherwise stay hidden. With the solution, all types of users can:

In-memory processing in SAS Visual Analytics makes it possible to quickly explore all your data in minutes or even seconds, to identify patterns, trends and relationships that were not evident before.

An easy-to-use interface enables users of all skill levels to visually explore all their data, execute analytic correlations to understand what the data really means, and visually present results through the Web and mobile devices.
• Work with point-and-click interfaces to drag and drop for a visual comparison of categories and measures.
• Test relationships among multiple variables in the blink of an eye.
• Spot correlations, then drill down for more detail.
• Click on the “What does it mean?” pop-up to see more information about the analysis that has been performed and an explanation of the relationships between displayed variables.
• Design compelling, interactive reports using ad hoc reporting tools and a wide variety of charts that let you add filtering, drill-down capabilities and more to illustrate visualizations in an engaging way.
• Use SAS Mobile BI to access critical information anytime, anywhere on mobile devices. And use mobile tethering to explore and interact with reports wherever you are – even if there’s no Internet access.
• Download reports, share ideas, make comments on the go – for faster decisions and uninterrupted workflows.

SAS Visual Analytics is tremendously powerful for its in-memory capabilities and ability to scale as your organization grows – but it is still cost-effective, said Choy. “One of the ways we’ve made it cost-effective is to use commodity hardware, taking advantage of Hadoop for data persistence if you have that in your architecture.”

At the technology heart of SAS Visual Analytics is SAS® LASR™ in-memory server, which was designed to process and deliver analytic results immediately. SAS LASR Analytic Server has been tested on all sizes of data and is extremely scalable, bypassing the known column limitations of many relational database management systems (RDBMS). This processing power, coupled with SAS Analytics, makes this solution different from others that simply move data from an SQL database into memory. Other solutions cannot support regressions or logistics models because those capabilities are not built into databases.

Available for single-server environments such as those used by most workgroups, departments and small to midsize organizations, the solution includes parallel processing to help you scale cost-effectively as your needs grow.

Fast and Easy Visual Data Exploration

“One of the first things a business analyst wants to do when presented with a new set of data is to get some idea what it’s about,” said Jim Goodnight, CEO of SAS. “What are the outliers? What variables are related to each other? Up until now, analysts would have to spend hours and hours doing samples so they could actually get jobs to run. With SAS Visual Analytics, you can cruise all your records to create graphs and plots one after the other. It really allows you to understand your data better.”

“SAS’ strongest play with SAS Visual Analytics is to supercharge its predictive analytics capabilities. The time shift from hours to minutes promises to enable customers to do more analysis with more data and greater accuracy than ever before.”

Doug Henschen
An Example: Visually Explore Your Data

Imagine that you want to understand revenue expenses for a manufacturing company. By dragging and dropping hierarchies or categories onto the visualization pane in SAS Visual Analytics, you can quickly see how revenue expenses are doing by region. By hovering over the bubbles, you can see which regions are doing best in comparison to others. And you can double-click on bubbles to get more details about a region. It’s as simple as that.

Create Your Own Hierarchies

If you need the data organized a certain way for the business problem at hand, you don’t have to go to your company’s data specialists to request a new view. With SAS Visual Analytics, you have access to all of the data – and based on all of the data, you can create and modify your own hierarchies to explore it, however and whenever you want, without having to rely on someone else.

First, you simply create a new visualization. Then within the “Create a new hierarchy” area of the software, you can double-click or drag and drop the items (from a menu selection box) where you want to build a hierarchy. To view how the new hierarchy appears in the visualization, you can double-click on a bar in a bar chart or on a slice of a pie chart, and then drill down to different levels or go back up a level, depending on what you need. All of this can be done in seconds.
Choose the Best Visualization for the Data

When you’re working with data, it can be difficult to quickly understand what’s happening in the data simply by looking at rows and columns. Even guessing what type of chart to use can be a challenge. SAS Visual Analytics simplifies all that by using intelligent autocharting to recommend an appropriate type of visual for the information you’re trying to view. It could be a line or bar chart, a scatter plot or box plot, heat maps or bubble charts – anything from the portfolio of available visualizations.

Autocharting capabilities help users create the best possible visualizations, including those specifically designed to display big data.

Figure 2: SAS Visual Analytics provides autocharting and “What does it mean?” pop-ups to help nontechnical users create and understand data visualizations. The “What does it mean?” pop-up (bottom right corner) explains that the correlation shown in this binned box plot indicates a strong linear relationship between unit reliability and unit life span.

SAS Visual Analytics recognizes different elements in the data set and offers appropriate charting visuals. For example, if the data has geographic elements, SAS Visual Analytics may propose a bubble plot superimposed on a map of the regions. Or it may choose a line chart as the best visual for a selection of two variables, then change to a clustered bar chart when a third variable is added. Users always have the flexibility to select their desired visual – anything acceptable to the measures and categories chosen.
Refine the View

What if you only want to view data for a certain region, product line or some other variable?

SAS Visual Analytics has filtering capabilities that make it easy to refine the information you’re viewing. You can simply add a measure to the filter pane or select one that’s already there, and then select or deselect the items to filter. What if the filter isn’t meaningful, or skews the data in undesirable ways? SAS Visual Analytics uses histograms to help you better understand the composition of data. Histograms provide a visual distribution of the data, giving you cues about how the data will change if you filter a particular measure. Histograms save time by giving you an idea of what effect the filter will have on the data before you apply it. Rather than relying on trial and error or instinct, you can use the histogram to help you decide what areas to focus on.

Understand the Distribution of the Data

Understanding the distribution of the data is as simple as creating a new visual and dragging the measure or category onto the visualization pane.

By default, SAS Visual Analytics automatically calculates the best distribution for the data. But you also have the option to change that visual. Take an example of a very large data set. If you wish to view the distribution of all the data points in the data set, a histogram will help – but a better visual will be a box plot that graphically depicts numerical data through summary calculations such as minimum, maximum, upper and lower quartile, and median. This will not only show you the distribution of the data; it will also show you where the important 50 percent of your data is.

Figure 3: Interactive box plots help users quickly understand the distribution of the data.
Identify Relationships Among Variables

SAS Visual Analytics makes it easy to assess relationships among variables. Just select a group of variables and drop them into the visualization pane, and the intelligent autocharting function will display a color-coded correlation matrix that quickly identifies strong and weak relationships between the variables. Darker colored boxes indicate a stronger correlation, lighter boxes a weaker correlation. You can hover over a box to see a summary of the relationship. Or double-click on a box in the matrix for additional detail.

Previously, this type of calculation would have taken many hours; now it can be done in seconds. “By using box plots and correlation matrices, SAS Visual Analytics can speed up your analytics life cycle because analysts can now do variable reduction more quickly and effectively,” said Choy.

Look to the Future: Forecasting at Your Fingertips

Forecasting is an important tool for organizational planning because it estimates future values for your data based on statistical trends. Fortunately, SAS Visual Analytics can help you expand the culture of forecasting in your organization.

SAS Visual Analytics provides forecasting capabilities on the fly, giving you confidence to do further data exploration and analysis. It takes the complexity out of forecasting, so all types of users can see for themselves what might happen in the future. You no longer have to select the best forecasting algorithm for your data, since the software generates forecasts dynamically by automatically selecting the most appropriate algorithm. If you need more details about the forecasting algorithm that was used, you can select “What does it mean?” to see a pop-up explanation. You also have the option to select the forecasting intervals. To ensure consistent planning, you can save visualizations and share them with others through reports, the Web viewer and mobile devices.

“By using box plots and correlation matrices, SAS Visual Analytics can speed up your analytics life cycle because analytical modelers can now do variable reduction more quickly and effectively.”

Justin Choy
Global Product Management, Business Intelligence, SAS

On-demand “What does it mean?” pop-ups give business users clear explanations of complex analytic functions, correlations and linear regressions in a language they can understand.

Figure 4: With automated forecasting capabilities, SAS Visual Analytics chooses the most appropriate forecasting algorithm for the selected data. “What does it mean?” pop-ups (lower right corner) provide explanations of analytic functions and data correlations so even nontechnical users can understand what the data means.
Create Your Own Visual Reports and Dashboards

Once you’ve had a chance to visualize and explore your data, you’ll likely see something that you want to share with someone else. Or you might want to generate a report based on the data you have been exploring. The SAS Visual Analytics Designer provides the tools to create and distribute Web-based reports.

Through a graphical interface, report authors can get wizard-driven help for previewing, filtering or sampling data before creating visualizations and reports. A variety of formats are available: standard and three-dimensional bar charts with multiple lines; standard and three-dimensional pie charts; scatter plots; heat maps; bubble charts; and tile charts – all with the option for annotated reference lines.

The reports are dynamic and interactive. For example, reports can have multiple tabs, each with unique sets of visualizations, all of them clickable to explore up or down a level in the hierarchy. With drag-and-drop simplicity, report authors can define the interactions among visuals in a report, specify the type and appearance of the report page, and add labels and annotation.

Figure 5: Business users can create their own reports and dashboards using a visual workspace.
Publish Information to the Web and Mobile Devices

Decision makers get the insights they need, when they need them, even when they’re on the go. They can quickly open, view and interact with reports from the Web, via an Adobe PDF file or from an iPad® or Android tablet. The mobile app can be downloaded from Apple’s iTunes® store and Google Play. Analysts can quickly view data from multiple angles and interact with it in many ways. Easy-to-use collaboration capabilities promote idea sharing while saving valuable time. You can annotate screen captures of reports and email them to others, who can add their thoughts as well. Or capture your comments via video and audio to share.

Executives or any mobile user can easily benefit from the interactive report-viewing capabilities. The visual, self-service interface makes it very simple for all types of users. Just open the SAS Mobile BI app to see your portfolio of reports. Click on the library and navigate to a shared folder to look at reports and download new ones. Click “Subscribe” to download a report. The display shows thumbnails of the reports you subscribe to, which can be viewed at any time, even when offline.

Users working with reports can interact with charts just as they can when using the Designer toolbox. They can also save reports to PDF or PNG formats for printing.

“With SAS Visual Analytics, you can explore your data, discover new insights, generate reports and deliver the information to the people who need it, all from a single solution. Whatever your industry – retail, insurance, health care and life sciences, or financial services – SAS Visual Analytics can help.”

Justin Choy
Global Product Management, Business Intelligence, SAS

Figure 6: Get a quick, easy visual understanding of customers or operations on your mobile device.
Closing Thoughts

Even calculations with the most common descriptive statistics can become complicated when you are dealing with today’s data. You don’t want to be restricted by column limits, storage constraints and the limited data types that are supported by traditional data architectures. The answer is an in-memory engine that accelerates data exploration tasks and a graphical interface that displays the results in simple visualizations.

“Dealing with all types of fast-changing records on a regular basis is just a reality of doing business today, and SAS understands that,” said Marchi. “SAS Visual Analytics allows you to explore all of your data using visual techniques combined with industry-leading analytics. Visualizations such as box plots and correlation matrices help you quickly understand the composition and relationships in your data.”

All types of users, including those with limited analytical and technical skills, can quickly view and interact with reports via the Web or mobile devices, while IT maintains control of the data and security. The net effect is the ability to accelerate the analytics life cycle and to perform the process more often, with more data – all the data, if that’s what best serves the purpose.

By using all data that is available, users can look at more options, make more precise decisions – and succeed faster than ever before.

Learn more

SAS Visual Analytics helps everyone use analytics to get more precise insights for better decisions. Try SAS Visual Analytics for yourself by visiting: sas.com/vademos.

For more about SAS Visual Analytics, see: sas.com/visualanalytics

To watch a video demo of SAS Visual Analytics, visit: youtube.com/watch?v=3lFNkT_C6Nc
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