Getting the Most Out of SAS® Visual Analytics: Design Tips for Creating More Stunning Reports

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ABSTRACT

Have you ever seen SAS® Visual Analytics reports that are somehow more elegant than a standard report? Which qualities make reports easier to navigate, more appealing to the eye or reveal insights more quickly? These quick tips will reveal several SAS Visual Analytics report design characteristics to help make your reports stand out from the pack. We cover concepts like color palettes, content organization, interactions, labeling, and branding, to name just a few.

INTRODUCTION

A colleague of mine once described report building as a "dark art." Though it was intended to be humorous, his comment inspired an interesting line of inquiry: Is there an "art" to making reports look nice? Is this skill an innate talent that comes naturally to some, but not to others? Or, perhaps could there be characteristics of an attractive report that can be studied and leaned?

This paper would be seriously short if I said it couldn't be learned. Instead, I believe that anyone can build a beautiful report with SAS Visual Analytics Designer. Don't worry if you don't consider yourself, "creative," "artistic," or, "have an eye for color." Yes, all those things help, but are not required. There are indeed renowned experts in the field of data visualization, such as Stephen Few, that can discuss at great length the "art" of visualizing data (and I strongly encourage you to pick up a copy of his work). However, this paper is designed to show techniques specific to SAS Visual Analytics as well as discuss design best practices that I've gathered over the years of using SAS software. It's by no means comprehensive, and I'm sure you will develop your own best practices in this area. It's also important to note that I have strong opinions on these topics that I'm sure are debatable. I apologize in advance if I'm critical of any visualization techniques that are near and dear to your heart. As Mark Twain once wrote, "Education consists mainly of what we have unlearned."

PRETTY IS IMPORTANT

Yes. I said it. Making things look pretty is important. Think of it this way: an ugly report with great data takes too long to understand, reduces or skews important inferences, and is sometimes not even read. We've come a long way from the dot-matrix on green paper days, as have information consumers. Contemporary audiences have shorter attention spans and expect the eye to capture insight immediately. That's why a well-designed report optimizes the value of your data by eliminating distractions, allows the audience to see important things more quickly, and places things in the proper perspective. The combination of these three factors makes the viewer transcend complex interpretation and get right to good stuff.

## PLANNING FOR THE BIG PICTURE

One of the most important factors in building a beautiful report is the framework upon which it's constructed. A number of questions need to be asked before you ever put hands on keys:

- How will content be arranged? Are there big high-level groupings, or lots of disparate topics?

- Who will be viewing the reports? Will they want to explore or will they need to take a single pass?

- What's the general purpose of the report?

- Are there corporate themes or branding requirements?

All of these factors will have an effect on your design requirements, so here is where to start:

First, consult with the people in your organization who are responsible for corporate creative assets and branding. They will most likely be able to provide you with color palettes, logos, fonts, and so on, that are high quality and are compliant with your organizations standards. Don't forget to ask them when they last made changes, how often they tend to change these resources, and when they plan to change them in the future, so you can be sure to build these changes into your maintenance plan. Next, get to know the SAS Theme Designer for Flex application. It can be located in your SAS Visual Analytics instance, usually at http://yourserver.sas.com/SASThemeDesignerForFlex. Using the Theme Designer, you can create organization-branded themes and have them propagate to every report.

The application is extremely easy to use, and creating and deploying themes to your middle tier is just a few clicks away.
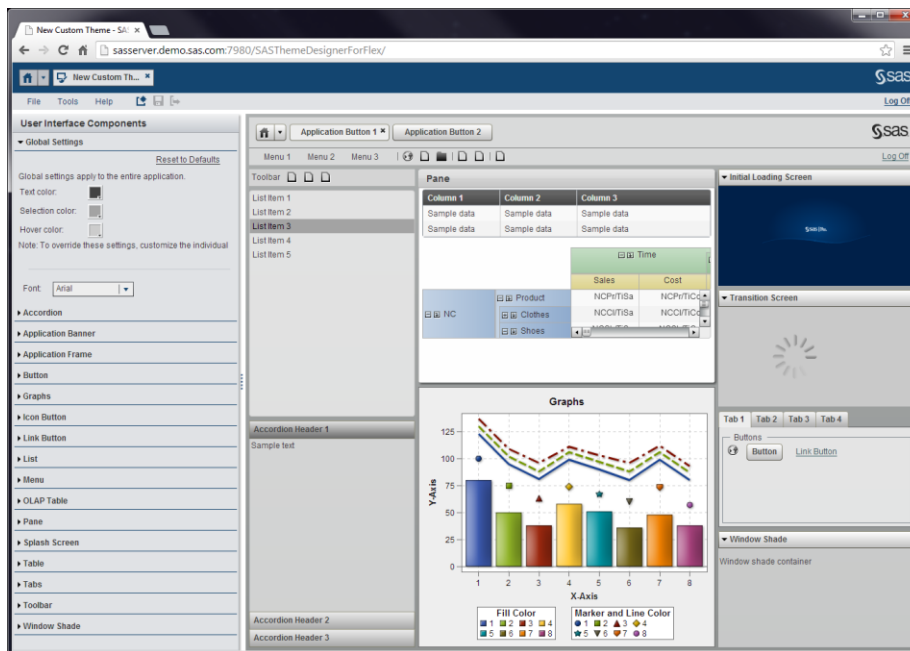

Display 1. The SAS Theme Designer for Flex

Next, it's a good idea to set up a "template" report, that is, a base report that can contain data and has all of your standard choices built in. This includes standard report objects, fonts, colors, and object arrangement patterns (how you tend to arrange things on the canvas). That way, each time you start a new report, you don't have to deal with all those settings. This practice also forces you to think about standardizing your user experience.

LAYOUTS

Now that we have our data and our template, we can get started on the good stuff. Browsers are all different, and they handle things differently. In addition, there's that fancy mobile app that has all types of resolutions. There are a couple handy window sizing buttons on the toolbar that let you test out or build to different resolutions. But honestly, I've never really found a use for them. Instead, I stand by the tried-and-true method of, well, trying it out, and truing it up. For example, a report that looks good on a 20" monitor, might look crummy on a little laptop screen.
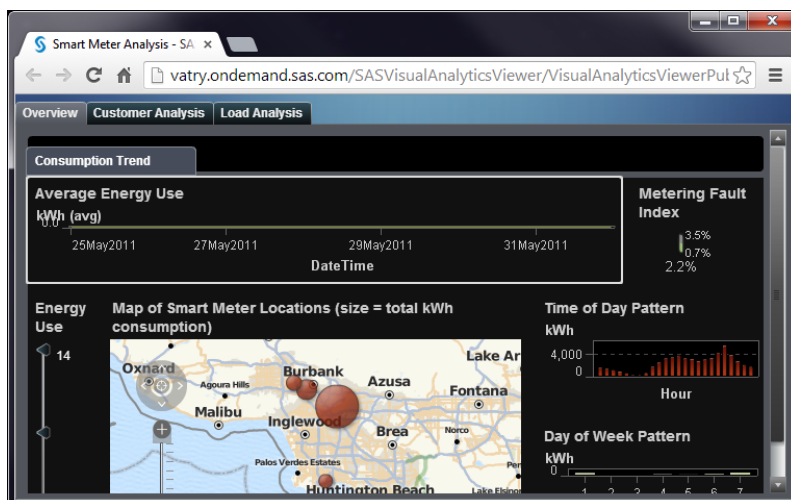
Display 2. These graphics are too squished for the design space

This will always be your nemesis, but it's important to always design to the scale that allows ease of visibility to the most people. Unfortunately, this can mean breaking up your reports into several topical sections instead of one big report. The key here is to get a good stake in the ground and then test it on multiple browsers, devices, and sizes.

COLOR, COLOR, COLOR!

My rules on color are very important. All too often I see a report that has too many colors that don't carry any meaning. This violates the primary design principal of keeping things simple and easy to understand. Fortunately, asking yourself three questions each time you see a spot of color will keep you safe:

- Is the color I'm seeing in line with my chosen palette? We chose a palette for a reason. Make sure you don't get sloppy. If you've used the Theme Designer, then most of the data colors will be in "compliance."

- Does the color I'm seeing MEAN something that is not being expressed in a different way? Color differentiation should have some sort of meaning. So if it's set on a "range," then it is telling a story. For example, there is no reason to have different colored bars in a bar chart, because it's designed to compare values (height). The values are themselves delineated by each having a bar. The color is meaningless, redundant, and distracting.

- Make sure people who are color blind or otherwise have a difficult time seeing color can still use color to define differences. I won't cover this in detail here, but it would be good to check out some resources on web design for accessibility.

Display 3. The chart on the left shows redundant meaning with the color selection

I'll end with one last comment on color. If you're using a black background for your report, for goodness sake, use a black background for your chart. Here's an example:
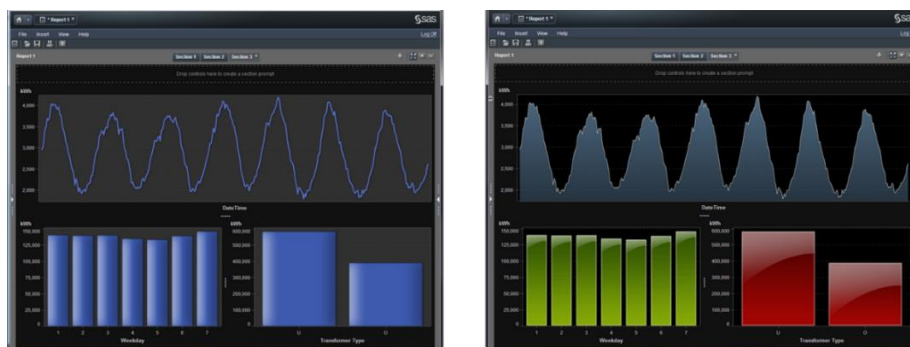
Display 4. Using more aggressive contrast makes charts "pop"

Both charts show the exact same data. The first chart uses all the default settings. Notice, however, how the chart on the right enables you to see your data better? A few slight changes can make your report pop!

CHART SELECTION

Don't use pie charts. Just kidding. But no really, don't use them. I'm sorry if you love them, but there are very few good uses of pie charts in this world. They're really designed to compare a couple very disparate values. When you throw 15 slices all of similar size, you've wasted 600 square pixels. The chart on the right shows the exact same data. Which graphic lets you more quickly and easily compare these values (hint: it's not the pie chart)?

Display 5. The bar chart provides a better comparison and sense of scale

There are a number of different charts, all with different purposes, so I'll just give you some examples. The concept to learn here is not to memorize what chart is good for what, but instead to learn that each chart has an analytic purpose, and to make sure you think about that purpose before you make your choice.

TREEMAP

The Treemap, or "tile chart" as I so lovingly call it, is fantastic for showing lots of data points in a small amount of space. You can use size and color to help draw attention to specific areas of interest. I also often use these charts to "control" other charts through interactions. They make excellent use of screen real estate and user control.

Display 6. Lots of data points in a small space, with good color gradient

My advice for this chart is to try to use both dimensions to maximize the use of your space. The measures should mean something when contrasted with each other. If you have only one measure, don't use the color dimension; that would violate the law of redundancy. Also, it's good to play around with the color gradient so that it reflects the sentiment of the audience. For example, if you have a number that is considered bad when it increases, make your color move toward a more "hot" tone.

TARGETED BAR CHART

Use this chart when you need to over emphasize a particular disparity or highlight a detail that might be buried in what seems like a normal value. For example, use the minimum value for a score, but the average for the bar height.

KPI

Standard dials can occupy a lot of space without providing a lot of information. I'd recommend using vertical bar-type indicators instead of round dials. Configure the style that looks the best, and be sure to choose one standard. I've often seen a mix and match of indicators without a clear reason why, and ultimately this distracts from our ability to recognize patterns quickly. Which set of indicators are easier to read?


Display 7. The bottom set requires almost no searching for which number is off

LINE CHART

Line charts are mostly used to look for trends or compare multiple trends over some sort of span (usually time). I'm definitely a fan of using a filled line chart, but would caution against anything that obscures a value (overlapping shaded areas). It's also important to note that a line chart should not be used for categorical value comparisons on the trending axis, since what we care about is the angle of the lines between points.

TABLE

The default table view, in my opinion, carries too much color that doesn't mean anything. I know it's a column heading because it's at the top. It doesn't need to be dark blue. However, a slight color variation is pleasing to the eye. Also, because the table view tends to carry a lot of detail, consider using multiple levels and conditional formatting. Avoid conditional formatting that creates too much color, such as everything in green with a few spots of red. Instead, make everything that's "normal" appear, well, normal.
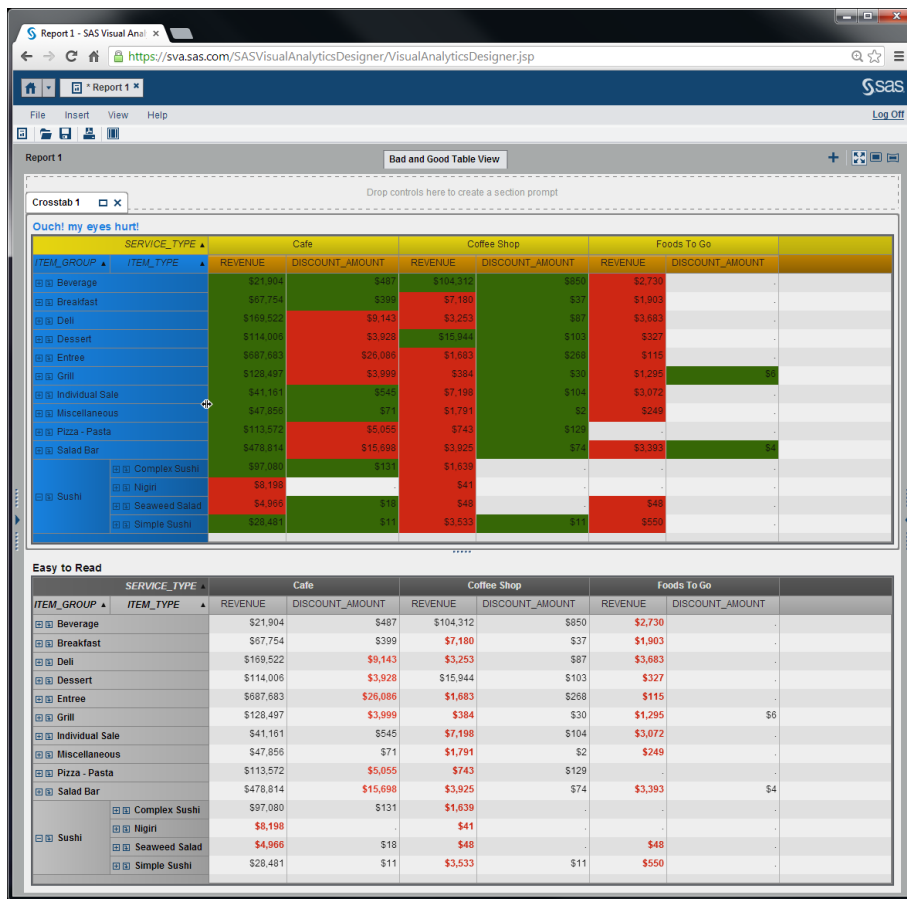
Display 8. The bottom table is more inviting and easier to spot outliers

MAP

Maps are an important way to visualize geographic data. However, they are sometimes used to show data that can be difficult to analyze that way and use the map gratuitously. So, be judicious with map views and ensure that the map component is more than just eye candy. That is, the geography should be a critical component to the analysis, as should the color and size of your data points.
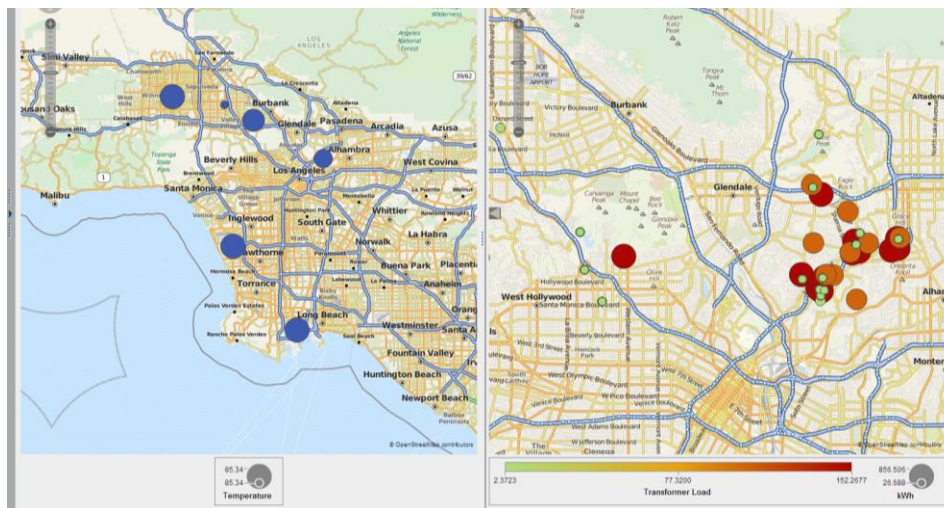
Display 9. The map on the right shows much more meaning and is a good use of maps

WATERFALL CHART

Waterfall charts are often a good alternative to a pie chart because they allow a better comparison between similar values yet still give a perspective on a category's contribution to the overall value. The bars are sorted from largest-to-smallest so you know immediately which numbers are higher even though they might be similar. They are also good for showing both negative and positive proportions in the same graphic.
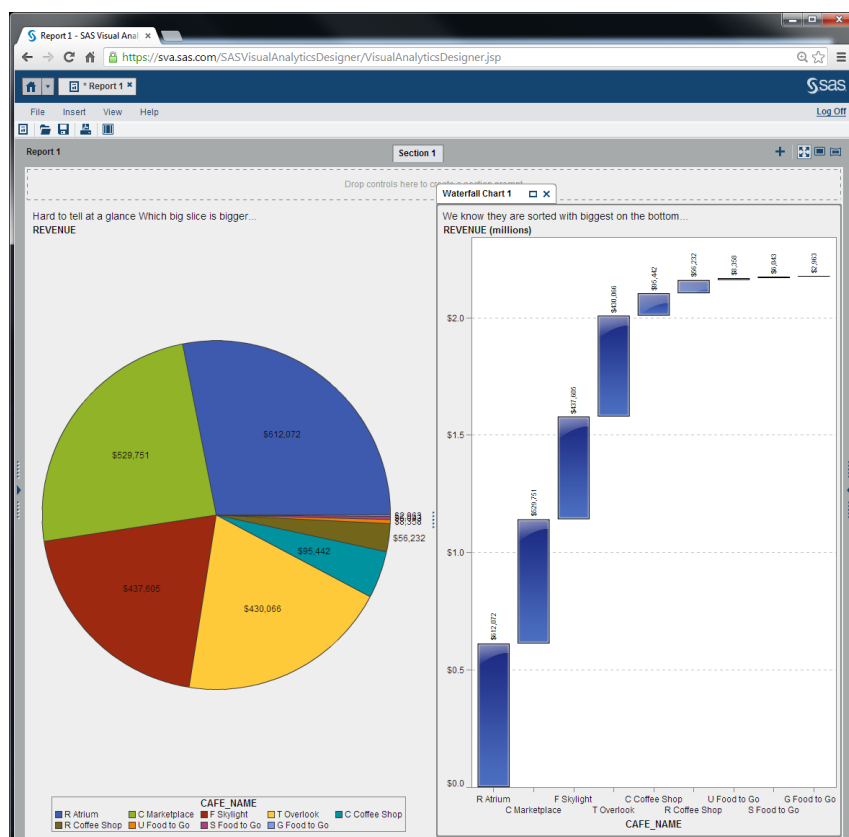
Display 10. The waterfall chart shows better comparison of similar values

FONTS AND LABELING

I've seen a lot of unusual fonts, colors, and special character features such as italics or bold lettering being over used. Be thinking about text as simple, elegant, and only when necessary. Use no more than three sizes of font that are all of the same type and family, with no more than three colors. There needs to be good contrast, so it's good to use a white, gray, and quasi-dark gray font color on a black background, and the reverse for a light background. The key here is to enable your audience to see titles first, and information about each object in decreasing intensity. In other words, make your titles and sections "pop," then allow them to learn more by directing their focus. Examples of this are scattered throughout the screen shots in this paper.

DATA

Often the most important and tedious work, is managing the data that's coming into the report. In the beginning we talked about templates, and the same goes here: include key metadata in your data sets. Often a lot of time is spent using the flexibility of SAS Visual Analytics to augment your data items for that report. For example, you might duplicate a value and change the name, or change the aggregate function or format. You can reduce the amount of time you spend structuring your data items for each report by saving it, and using your template each time you start.

If your data is large, it might be helpful to scale back the data set you use to build reports interactively, then substitute the "real" data in when it's time to go live. If you go this route, it is important that you do some testing with production-size data to work out any kinks and challenges you might have.

Which brings me to production performance. It's not usually necessary to bring back as much information as possible into the first refresh of the report. To improve the users' performance, be sure to add plenty of filters, set

them at reasonable levels, and then save your report with those settings. That way the user can get a "top-level" glimpse of the report, and minimal data is pulled back to the interface on the first pass. Then, users can peel back the filters as needed.

And last, it's important to pay attention to the finer details of your numbers. Does the decimal precision you show need to be there? Should a value be shown as a percent, or with a currency symbol? The key is to remove anything that would be distracting.

DON'T DO THESE THINGS

Here is a short list of things not to do. We've all done some of these at some point in our life, so all is forgiven. But pretty reports that are super useful follow these guidelines:

- Don't - Include pictures for "style." Reports are not a Microsoft PowerPoint presentation used to entertain. They are a functional tool from which to extract insight. Pictures get distracting and are eventually ignored.

- Don't include colors from 1985. Pastels have been out as long as rolling the sleeves on your sport coat. There are some wonderful color palettes out there that provide complimentary and contemporary color schemas. Make note of any websites that seem pretty and easy to navigate, and use their colors.

- Don't answer the same question with two competing graphics. Determine the best way to show something, and show it once.

- Don't always accept the defaults. The fastest way is not always the best way.

- Don't do anything you can't explain. Someone should be able to ask a question such as, "Why did you choose that color?" And you should have an answer, such as, "because it's a perfect contrast to that other color, so you can better compare those two values," or, "because most people see red as an indicator of something bad."

CONCLUSION

I hope this has provided some useful insight into why some reports can make you feel warm and cozy, and others leave you scratching your head, even when they were built using the same software, and the same data. I also hope you came away with some new ideas on how to improve your own reporting.

RECOMMENDED READING

Stephen Few's blogs, books, and tools at www.perceptualedge.com

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