

How No-Code Visualization is Fast Becoming an Asset for Data Engineering and Data Science Teams

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ABSTRACT

Either you are building a clinical visualization dashboard or a patient profile, data review platform or data reporting dashboard, how about you want to explain your favorite data science project to your team? No matter what tool you used to build your project like R\Python\SAS, no-code visualization is slowly becoming a default method to explain your results quickly to the public or concerned audience. In this presentation, you will learn one such example of how a data science project was conducted to explain a COVID dashboard and a few techniques to build a clinical dashboard using No-Code.

INTRODUCTION

Let us go through three main definitions mentioned in this paper.

No-code Visualization is the process of creating visualization without the need for manual coding. Many platforms and tools are available to create graphs, charts and other visualization through a user-friendly UI and typically involve using point-n-click or drag-n-drop method.

Data Engineering is a vital process in data management to collect, transform and store data for reporting, analysis and other purposes for data-driven decision-making process within organization. It requires a combination of technical skills; domain knowledge and an understanding of specific organization needs and goals of the organization. If analysis is an engine, then data is its fuel. High quality data and analysis are crucial for significant insights; based on accuracy, consistency, interpretability, reproducibility and statistical rigor.

Data Science, a multidisciplinary field that helps organization make data-driven decision, uncover patterns and gain valuable insights to improve business strategies and outcomes. Data scientists leverage technical skills, like R\Python\SAS to perform their analyses, domain knowledge and creativity to extract meaningful information from complex data.

Based on the definitions, we can see, both data engineering or data science need some coding skills and mathematical know-how to complete a project. A no-code visualization then becomes asset, as in, we can break the chain of doing everything in coding and transfer result-oriented work to no-code team to build informative reports. Reports done by no-code team can take many forms like interactive dashboards, exploratory data analysis and web apps. In this paper we will focus on no-code aspect as much as possible. In lay-man terms, we are going to focus on drag-n-drop or point-n-click functionalities.

TECHNOLOGY

Popular examples of no-code visualization are Spotfire, Tableau, Power BI etc.... In the same breadth, SAS Visual Analytics (VA), is the tool I have used the most in my 11 years at SAS. It is one of the many drag-n-drop tools available on SAS Viya Platform. SAS Viya Platform uses a browser for all its coding (R\Python\SAS) and drag-n-drop needs. Navigating between VA\VS\VML (Visual Machine Learning) is seamless. For this paper, my focus is on SAS Visual Analytics (VA) and SAS Visual Statistics (VS).

Out of the box, SAS VA comes with many objects. Some of objects are listed below in Fig 1. SAS Visual Analytics also allows users to import third-party visualizations or create custom visualizations using D3.js, a JavaScript charting framework.

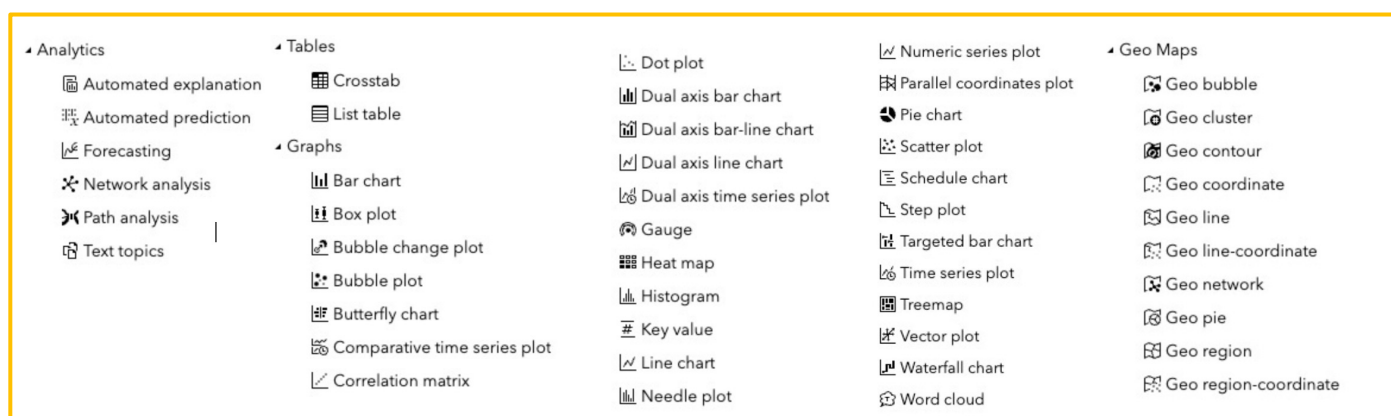


FIG 1: Some examples of objects available in VA OOTB.

As per SAS documentation, SAS Visual Statistics enables you to develop and test models by using the in-memory capabilities of SAS. SAS Visual Analytics enables you to explore, investigate, and visualize data sources to uncover relevant patterns. SAS Visual Statistics extends these capabilities by creating, testing, and comparing models based on the patterns discovered in SAS Visual Analytics. SAS Visual Statistics can export the score code, before or after performing model comparison, for use with other SAS products and to put the model into production.

The following models are available in SAS Visual Statistics:

- [Cluster](#) segments the input data into groups that share similar features.
- [Decision tree](#) creates a hierarchical segmentation of the input data based on a series of rules applied to each observation.
- [Generalized additive model](#) is an extension of the generalized linear model that allows spline terms in order to predict an interval response.
- [Generalized linear model](#) is an extension of a traditional linear model that allows the population mean to depend on a linear predictor through a nonlinear link function.
- [Linear regression](#) attempts to predict the value of an interval response as a linear function of one or more effect variables.
- [Logistic regression](#) attempts to predict the probability that a binary or ordinal response will acquire the event of interest as a function of one or more effects.
- [Nonparametric logistic regression](#) is an extension of the logistic regression model that allows spline terms to predict a binary response.

How does a No-code project begin and end?

Forming a Team & Goal

Assuming there is a No-code project team, consisting of a project lead and its member, it begins with a goal in mind. Goal is determined by report consumers or audience. As an example, goal can be a patient chart or patient profile for a target audience involving a team of medical reviewer. In other example, goal can be exploratory data analysis for a target audience comprising of a scientist, engineers or statisticians.

Adopting Technology & Data

Once team and goals are set, identifying technology is not an easy task. Even though it is no-code, project teams have lot of choices to decide on tools or a platform. From cloud vendors, commercial software platform and niche visualization vendors, you as a consumer have lot of choices. May be your organization already have procured a no-code tool or platform. Reach out to your IT team as they might know more about this space.

Collection of data is another step; in pharma we are always collecting data. It could be either a patient data involved in clinical trials or a commercial data. Data vendors is another resource in providing access to diverse and valuable datasets that organization can use for various purposes. Depending on the goal, you can involve data engineering team to further transform, clean or standardized the data to meet your end goal.

Building report and Adoption

After initial training is done, start focusing on goal and objectives by building preliminary reports. If you are new to a no-code project; start simple, learn from your mistakes to improve, and repeat. Take input from your target audience, improve the report and repeat. Have white boarding session. If you want to be successful at No-code projects, focus on user adoption, training and try to grow your audience.

As your no-code, report building skills improve, you can then take on some of the heavier workload, involving automation and continuous improvement of a live report. Live dashboarding is the report, where you get data refresh every day and dashboard is expected to reflect it in an automated way. If your goal is to build this kind of no-code project, then an early adoption of a technology is key. For example, in SAS Visual Analytics, you can do auto-refresh of the dashboard while SAS Viya can be scheduled for an auto-update of the data.

As a No-code project team, you will then build libraries of reports and template that can be used in various project across your org. Lots of no-code project, appears quite like building an application. If you quickly peek at your latest mobile phones, you will see plethora of apps doing all kind of stuff for you. For your end-user, this will be similar in concepts.

Usecase 1

[Using data visualization to track the coronavirus outbreak.](#)

In this usecase, data was collected from WHO, CDC, ECDC, NHC, DXY & compiled by JHU CSSE.

I was part of one of the many data engineering team, and my task was to collect the data from EU. We had prepared the common data model, so that, when we collect the data from all over the world, each one of the team adheres to metadata, structure, standard, quality, integrity and day to day checks to ensure the accuracy of the data that goes into a Coronavirus Dashboard Report as shown in Fig 2.

SAS programs created during data engineering projects uses proc http calls to fetch data from various government sources. Please click on the hyperlink [Data Sources and SAS Program](#) to know more about original source of data and programs.

SAS developers and data scientists maintained a Coronavirus Dashboard Report. The dashboard was refreshed daily with new data from several public data sources. Public users regularly saw how disease was progressing, inquired about new coronavirus cases, infection rates, recovery rates and fatality rates.

Please click on the hyperlink above to know more the dashboard and use of SAS Visual Analytics as a no-code platform.

Fig 2 is an example of live interactive dashboards refreshed daily. Public users around the world can navigate various tabs like Global Status, Location Analysis, Epidemiological Analysis, Trend Analysis, Spread over time and Collective insights.

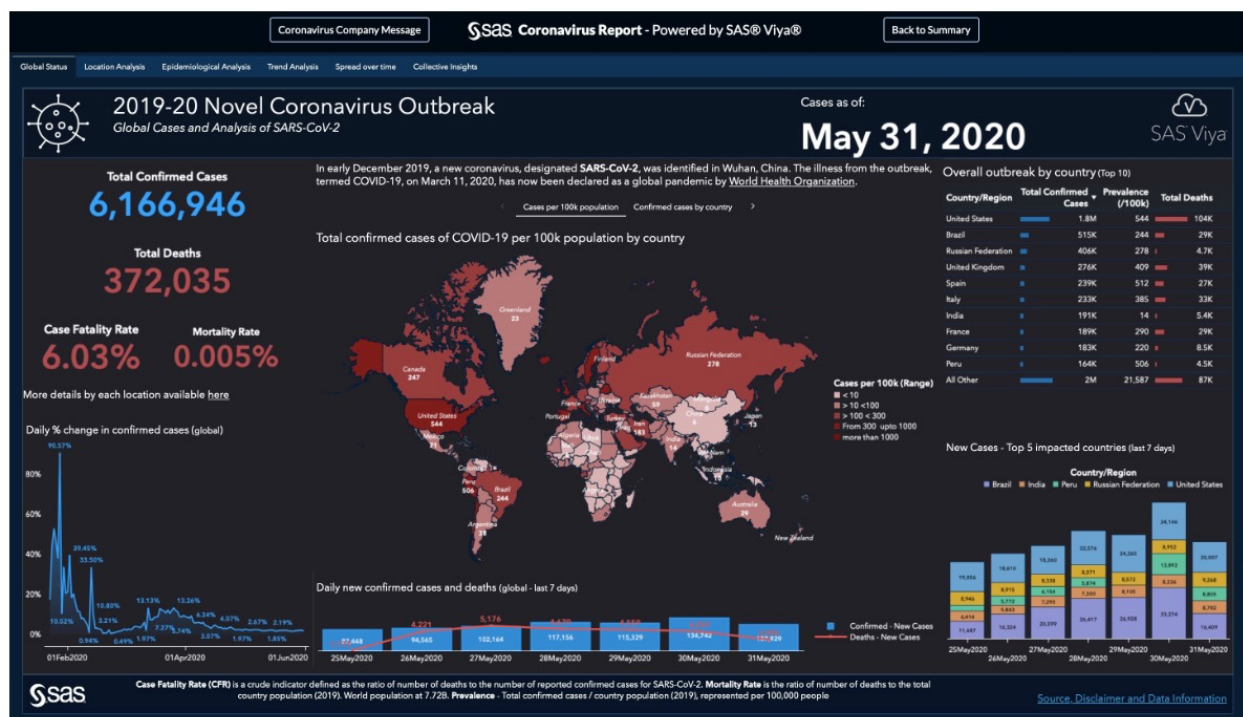


FIG 2: Overview of COVID-19 disease outbreak.

Use case 2

[Building a clinical trial dashboard.](#)

Please click on the link above to see the video on how to build a demographic dashboard. If pictures are worth 1000 words, then hopefully the video link above will motivate more users to become No-code developers.

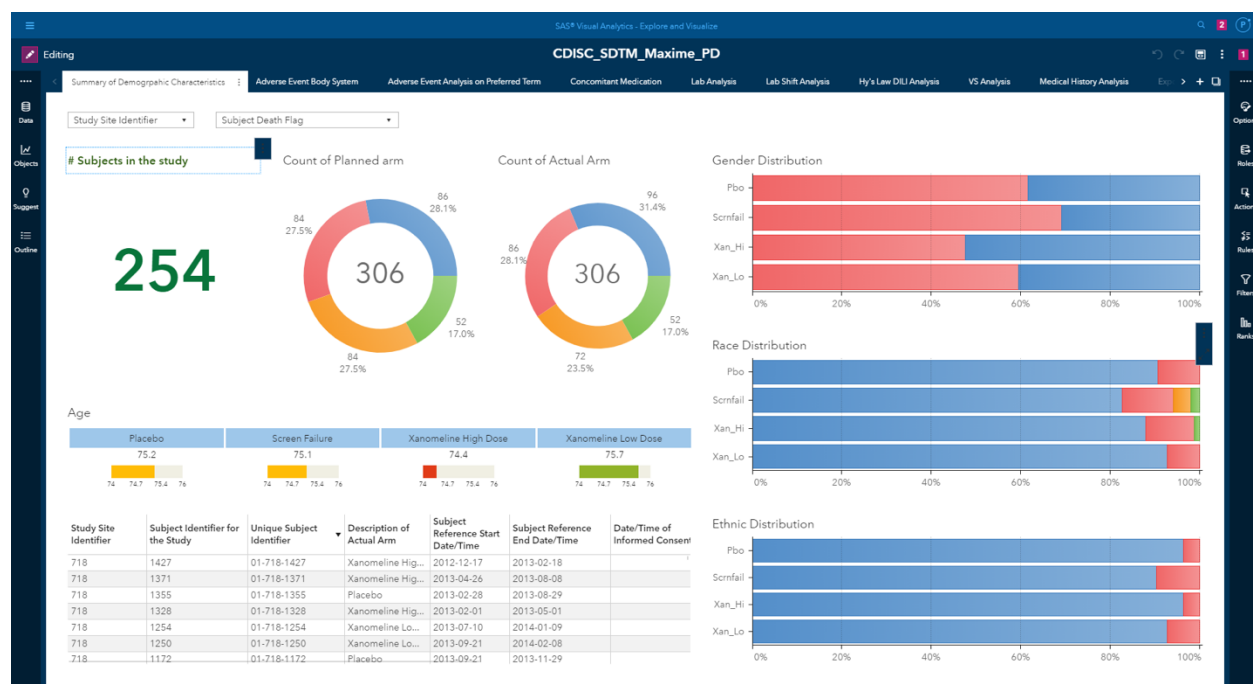


FIG 3: Interactive demographic dashboard.

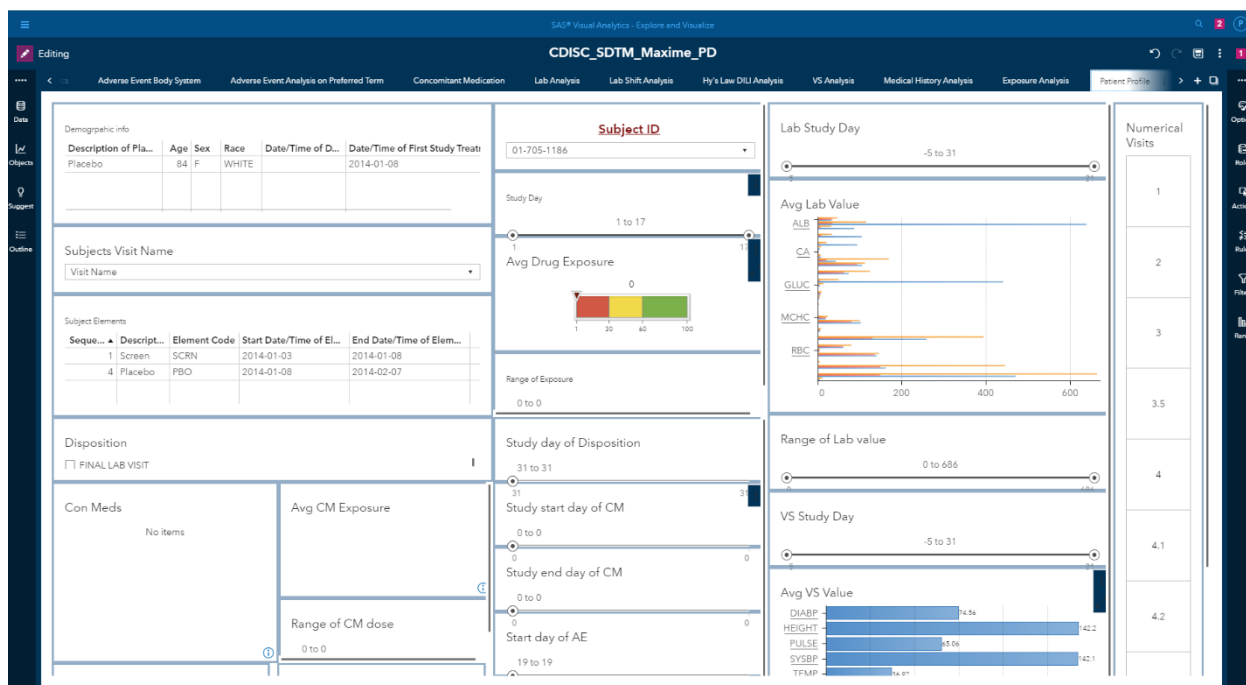


FIG 4: Patient profile view.

CONCLUSION

As a long time no-code developer, I've enjoyed working on various projects to contribute directly to the creation of applications either it involves my domain knowledge in clinical trials or creating administration dashboard or exploratory data analysis of various data science projects. At SAS internally we use no-code reports on various projects in sales & marketing, sas content assessment, [coronavirus out-break](#) etc. Reports build by no-code are not just tied to pharma or clinical trials. If you have data, you can visualize it, analyze it and report it all via no-code.

REFERENCES

[SAS Visual Analytics Documentation](#)

[COVID-19 Epidemiological Scenario and Critical Resource Utilization Prediction Program](#)

[Data sources for COVID-19 reporting](#)

[Using data visualization to track the coronavirus outbreak.](#)

[VA Report Example: Using D3js in your Report](#)

RECOMMENDED READING

[SAS Viya](#)

[SAS uses analytics, AI to empower community and track pandemic](#)

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