

Visualizing Insights, Empowering Discoveries: SAS Viya Unleashed in Life Science Analytics

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ABSTRACT

The life sciences industry has recently produced a tremendous amount of data at a quick rate from a variety of sources, including clinical trials, genomics, proteomics, and patient records. For improvements in research, medication discovery, and patient care, it is essential to draw insightful conclusions from this data and make defensible decisions. In this setting, SAS Viya, which provides sophisticated data visualization, analytics, and exploration capabilities, emerges as a potent tool. This paper explores the application of SAS Viya in the life sciences sector, highlighting its benefits, features, and real-world use cases.

INTRODUCTION

The life sciences sector has experienced a data revolution, necessitating the use of cutting-edge tools to process, examine, and interpret the massive and intricate datasets produced. By combining intuitive and interactive data visualization capabilities with powerful analytics, SAS Viya is a leading solution that addresses these issues. This paper focuses on how SAS Viya helps the life sciences industry turn data into useful insights.

SAS VIYA FEATURES AND CAPABILITIES

DATA INTEGRATION

Electronic health records, data from clinical trials, genetic databases, and more can all be integrated into SAS Viya. Users can connect to many data sources, transform data, and produce a unified view of heterogeneous data with this tool.

To make it simple for you to define a report, most of the data that is accessible in SAS Viya has been prepared by a data administrator or analyst. Tables are loaded into memory by data administrators. Data can be added or imported using the Data pane. You can import data from a file into SAS Viya if you have authorization to do so. SAS data sets, Microsoft Excel spreadsheets, and delimited text files (like CSV files) are all supported file types. When it is feasible to import data, the Choose Data window has an Import tab. Data pieces, which might be calculations or columns in physical data (tables), are present in all data. Reports may include search results from several sources of data.

You can choose one or more data sources as well as the data items for your report in the Data pane. In the Data pane, you have three options for working with your data: add data, import data, or begin with

recently used data sources. Using SQL joins, you can add data, import data, or create a new data source using the Data pane (seen in **Figure 1**).

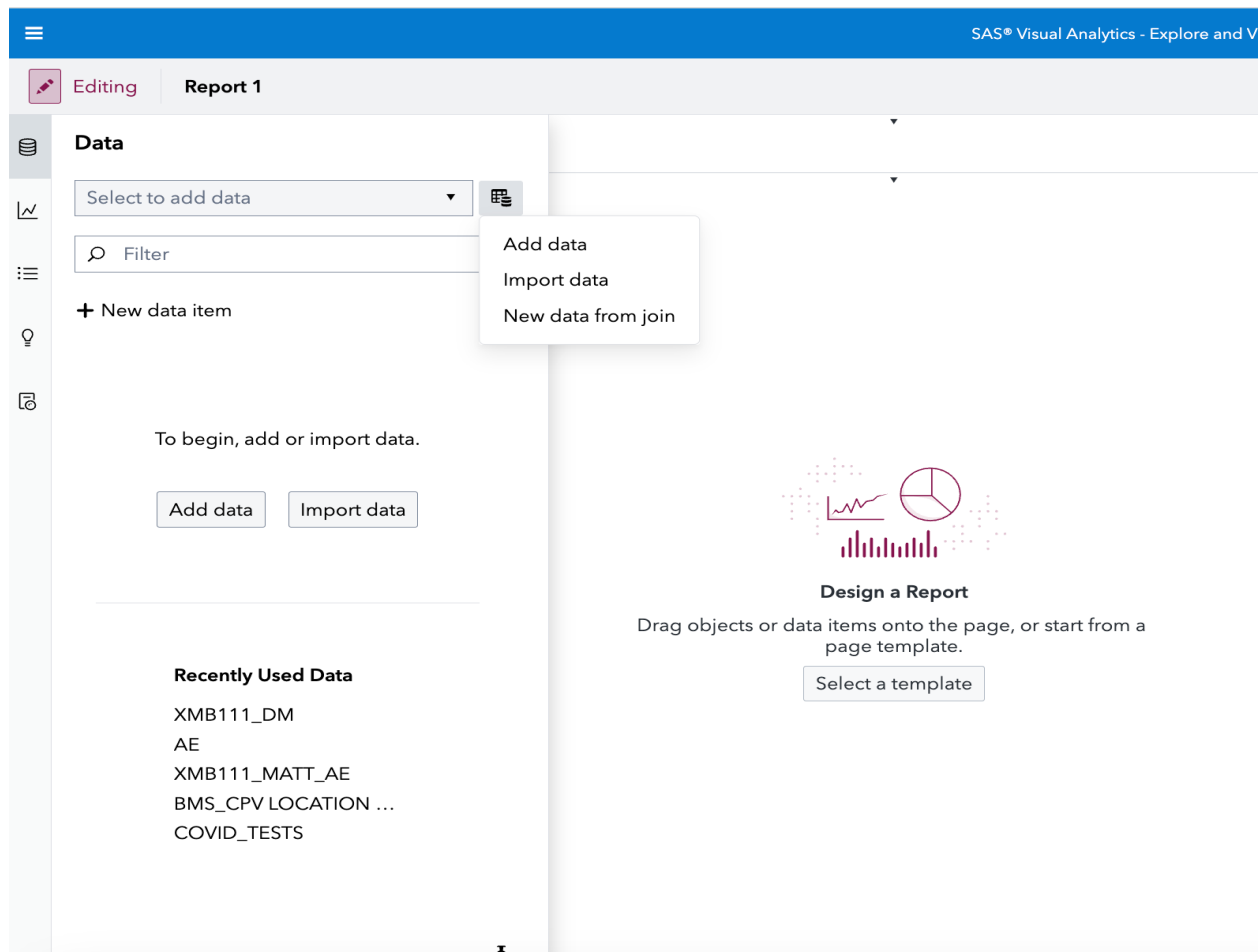


Figure 1: SAS Viya Data Pane

INTERACTIVE DATA EXPLORATION

The platform's user-friendly design enables users to visually explore data. Interactive data exploration makes it easier for researchers to spot patterns, trends, and anomalies, which aids in the creation of hypotheses and data-driven decisions.

All your reports can have objects thanks to SAS Viya. You can add one or more objects to display the results after choosing your data source and data elements. Alternately, you can choose data after adding objects. The Objects pane (**Figure 2**) shows all the accessible objects, including tables, graphs, geo maps, controls, containers, and other items. Tables, graphs, controls, containers, and other objects that can be used in reports are listed in the Objects pane. An object can be dragged onto the canvas from the Objects pane. Tables, Graphs, Geo Maps, Controls, Analytics, Containers, and Content (which includes photos, text, and online content) are the object kinds that are divided up into the Objects pane.

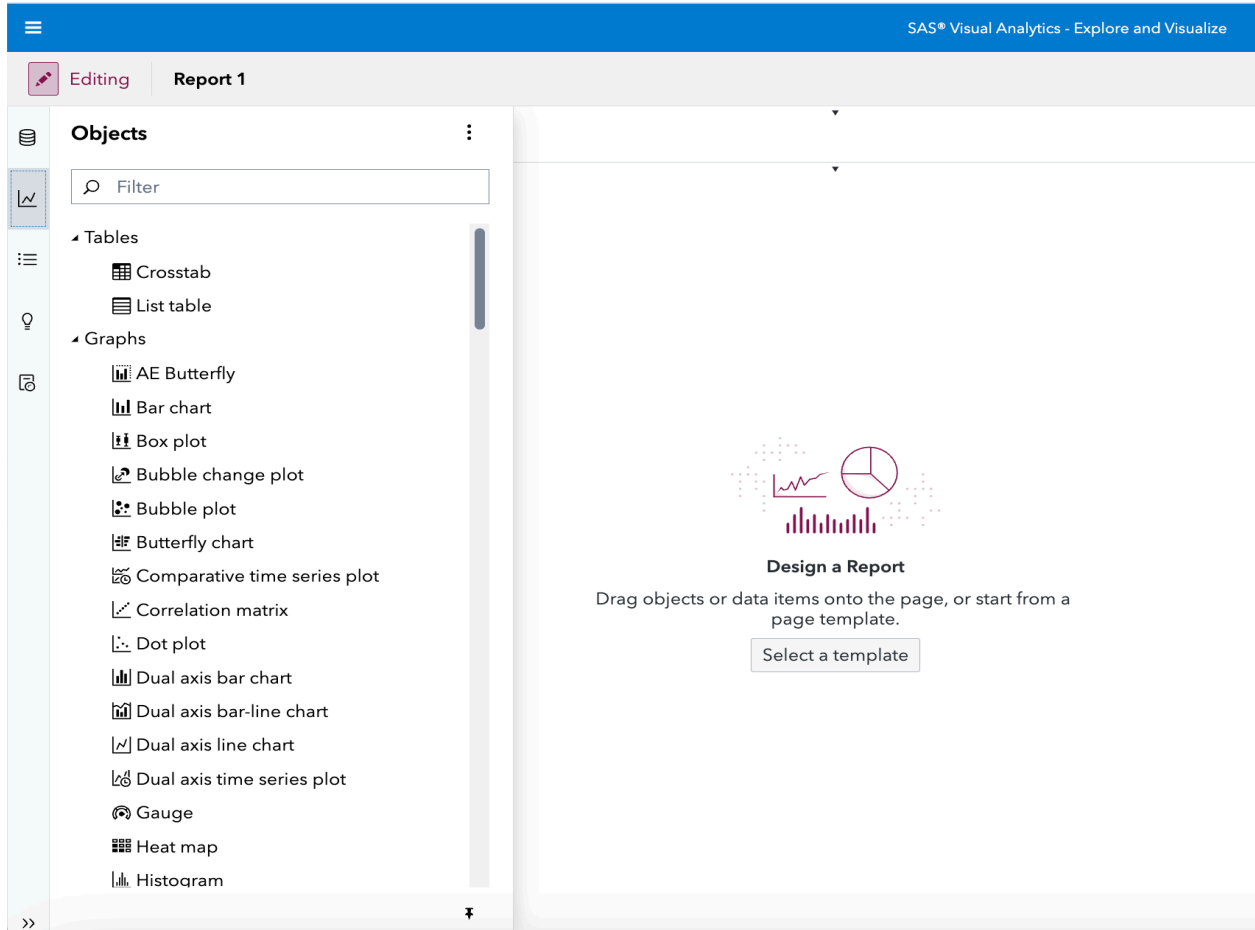


Figure 2: Subset of Objects Available in SAS Viya

Dashboards from SAS Viya are interactive, visual presentations that enable quick and effective data exploration and analysis. The dashboards are quite interactive. To acquire deeper insights, users can delve down into data, filter information, and take actions like sorting and highlighting. To explore more information or filter other visualizations appropriately, users can choose data points or regions on a visualization. Users have the option of sharing dashboards with coworkers or other organizational stakeholders. They can work together by giving people access to the data so they can interact with it and explore it.

An example of a life science dashboard is shown in **Figures 3 and 4**. We took CDISC SDTM structured data (a standard for regulatory submissions) and built an example dashboard on this data. These could be extremely useful for an entire clinical development team on a study medication!

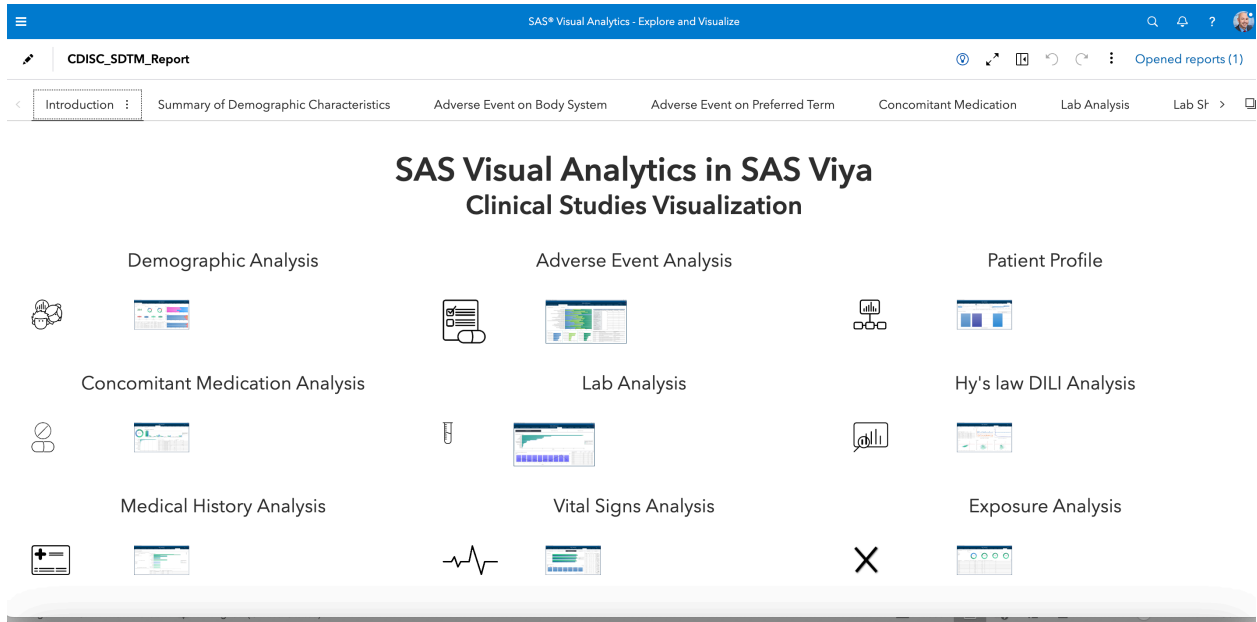


Figure 3: CDISC SDTM Dashboard Main Page

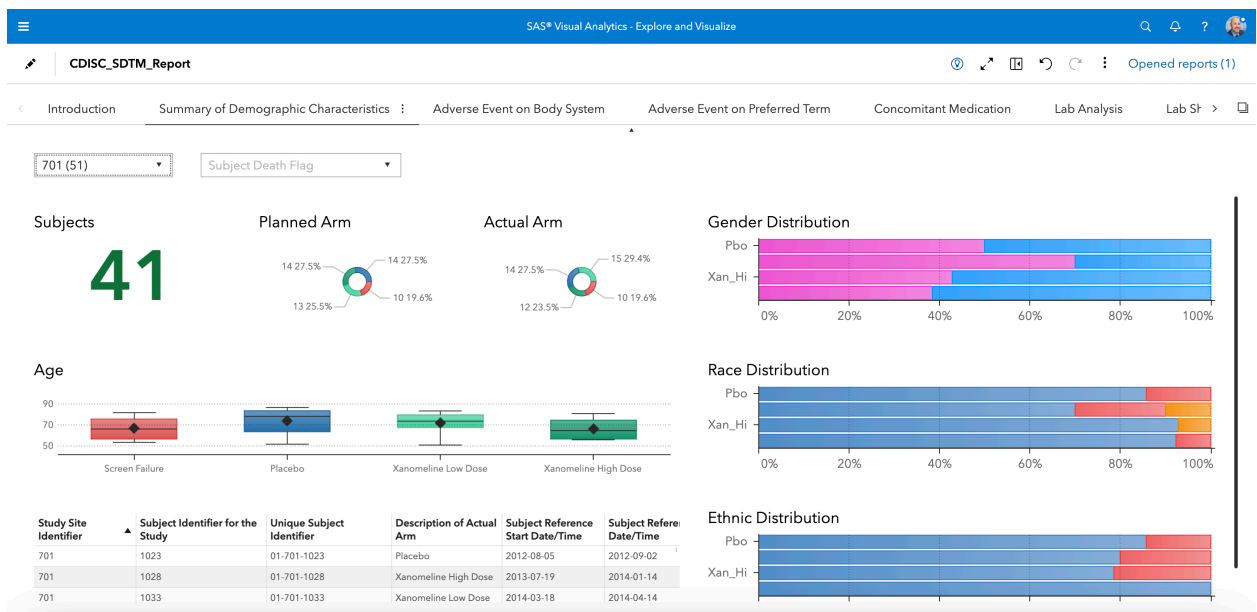


Figure 4: CDISC SDTM Demographics Dashboard Example

Monitoring and assessing adverse events (AEs) associated to medical products, such as medications and vaccines, is the focus of pharmacovigilance, a crucial area of the pharmaceutical and healthcare sectors. To protect patient wellbeing and guarantee ongoing therapeutic progress, the gathering and analysis of AE data is essential.

AE data include reports of adverse reactions, side effects, and unexpected results that patients may have encountered while taking or after utilizing a pharmaceutical product. Healthcare experts, regulatory agencies, and pharmaceutical corporations carefully collect, examine, and report this data. In **Figure 5** we see an example visualization of adverse event data including the ability to subset to only “Serious” AEs.

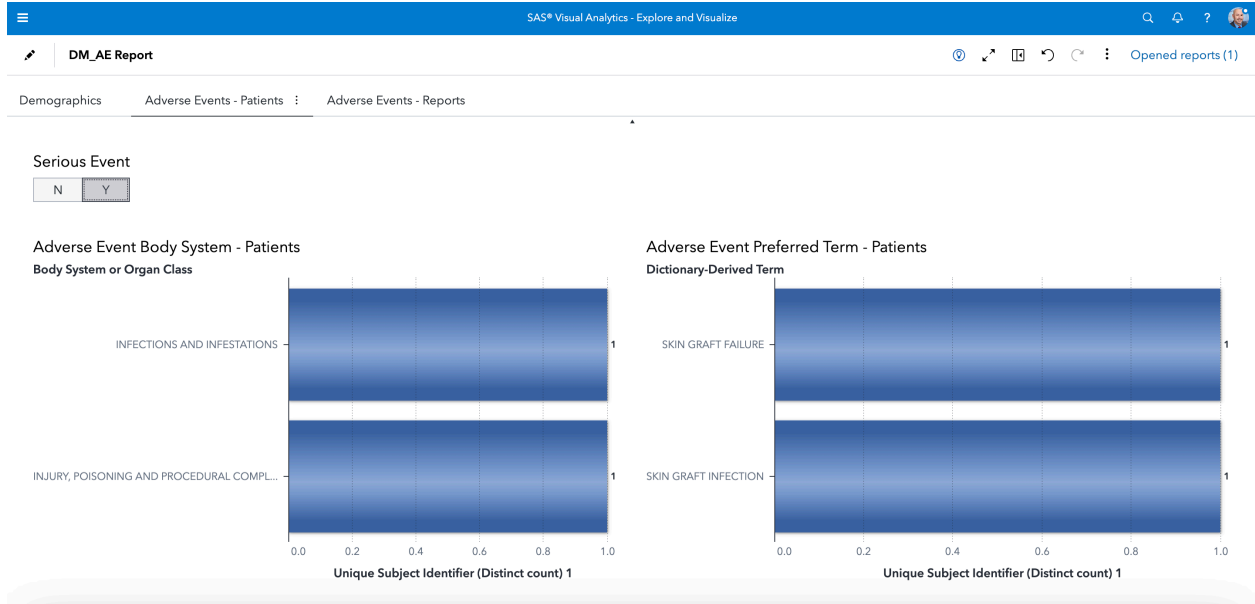


Figure 5: Adverse Event Dashboard

In clinical studies, queries protect patient safety, regulatory compliance, and data integrity. They carefully examine data to make that clinical studies produce reliable, accurate, and significant results. They are therefore an essential component of the rigorous and moral quest to advance medical knowledge and enhance patient care through clinical research.

Timely resolution of queries is essential to keep the clinical trial on track. Efficient query management helps prevent delays, ensuring that the study progresses as planned and minimizing costs. **Figure 6** gives an example of a clinical trial query dashboard. Highlights of the dashboard include status, type of query, average query time open, total queries, and query days open by site.

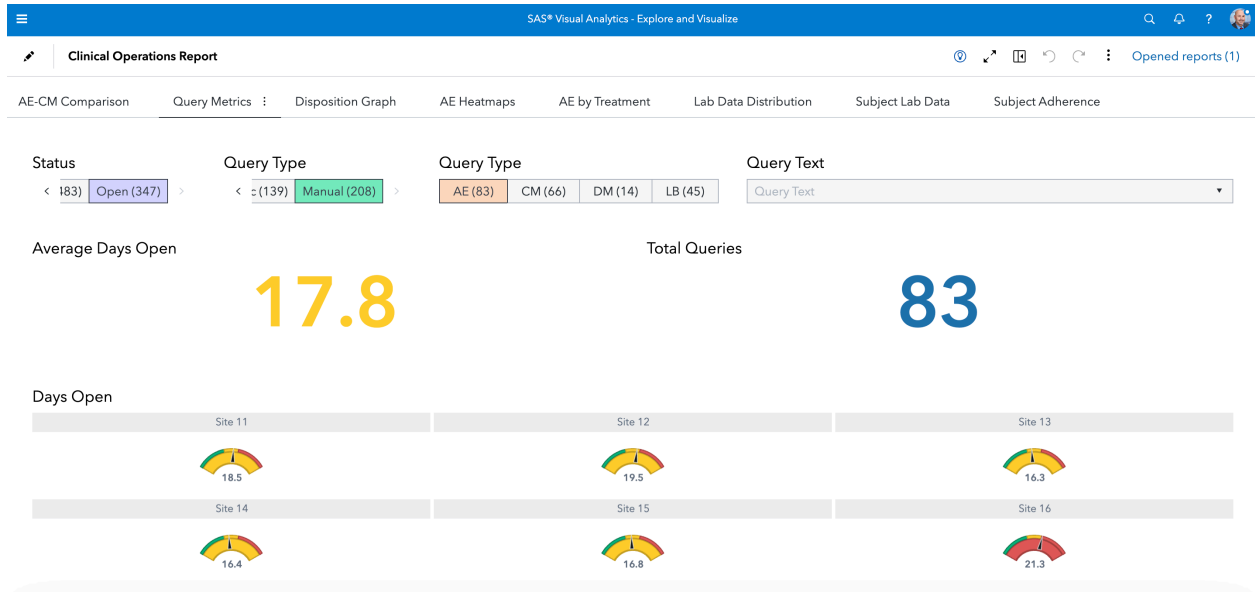


Figure 6: Query Dashboard

ADVANCED ANALYTICS

Numerous statistical and predictive analytics tools are available through SAS Viya. To find hidden patterns in the data, researchers might do intricate analyses like decision trees, Sankey diagrams, regression modeling, and clustering.

For example, one common view of clinical trial data in a Sankey diagram (**Figure 7**) is when subjects are going off study. It may be beneficial to track when subjects move to “lost to follow-up.” Is there some aspect of the study at a given visit that could result in subjects not continuing the study?

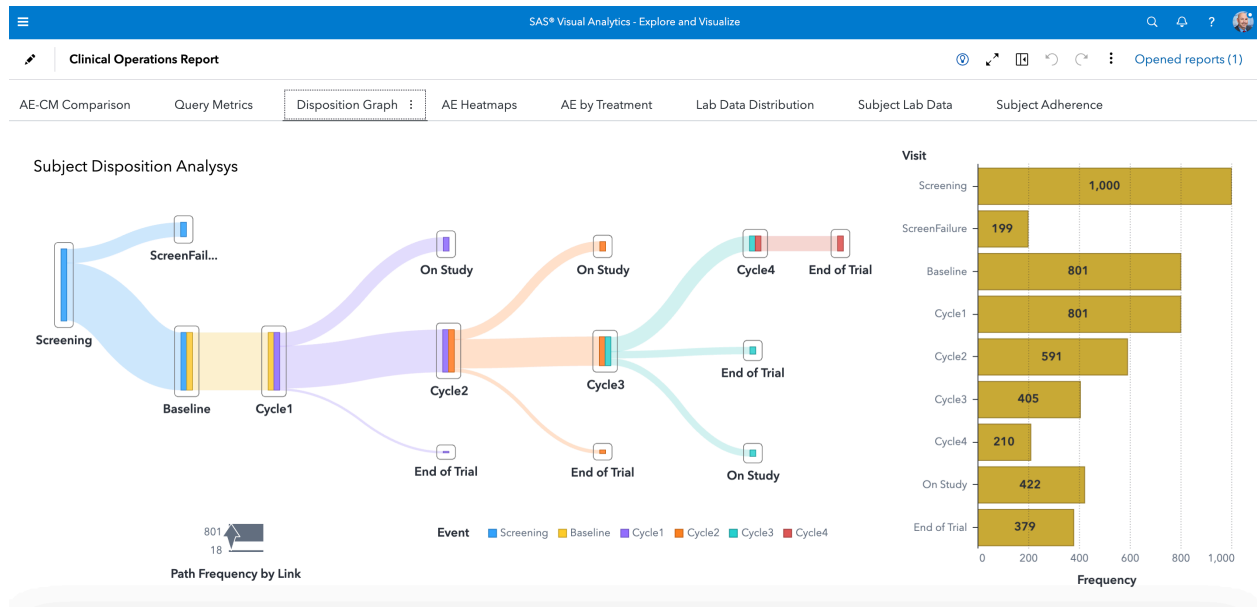


Figure 7: Sankey Diagram of Clinical Study Participant Status by Visit

SELF-SERVICE BUSINESS INTELLIGENCE

SAS Viya's self-service business intelligence capabilities are one of its main advantages. Without the need for complex programming abilities, researchers may develop customized reports, dashboards, and visualizations. This enables subject-matter specialists to logically examine and exchange findings.

Templates within SAS Viya are a predefined set of formatting and layout settings that can be applied to reports, tables, and visualizations. Templates are used to standardize the appearance and structure of your reports and dashboards, ensuring a consistent and professional look and feel. What if for functional teams in my clinical study, we had a (set of) template(s) for them to visualize their data in a format they

preferred? **Figure 8** is a subset list of templates currently available in my SAS Viya environment. There are SAS-provided templates along with user-created templates.

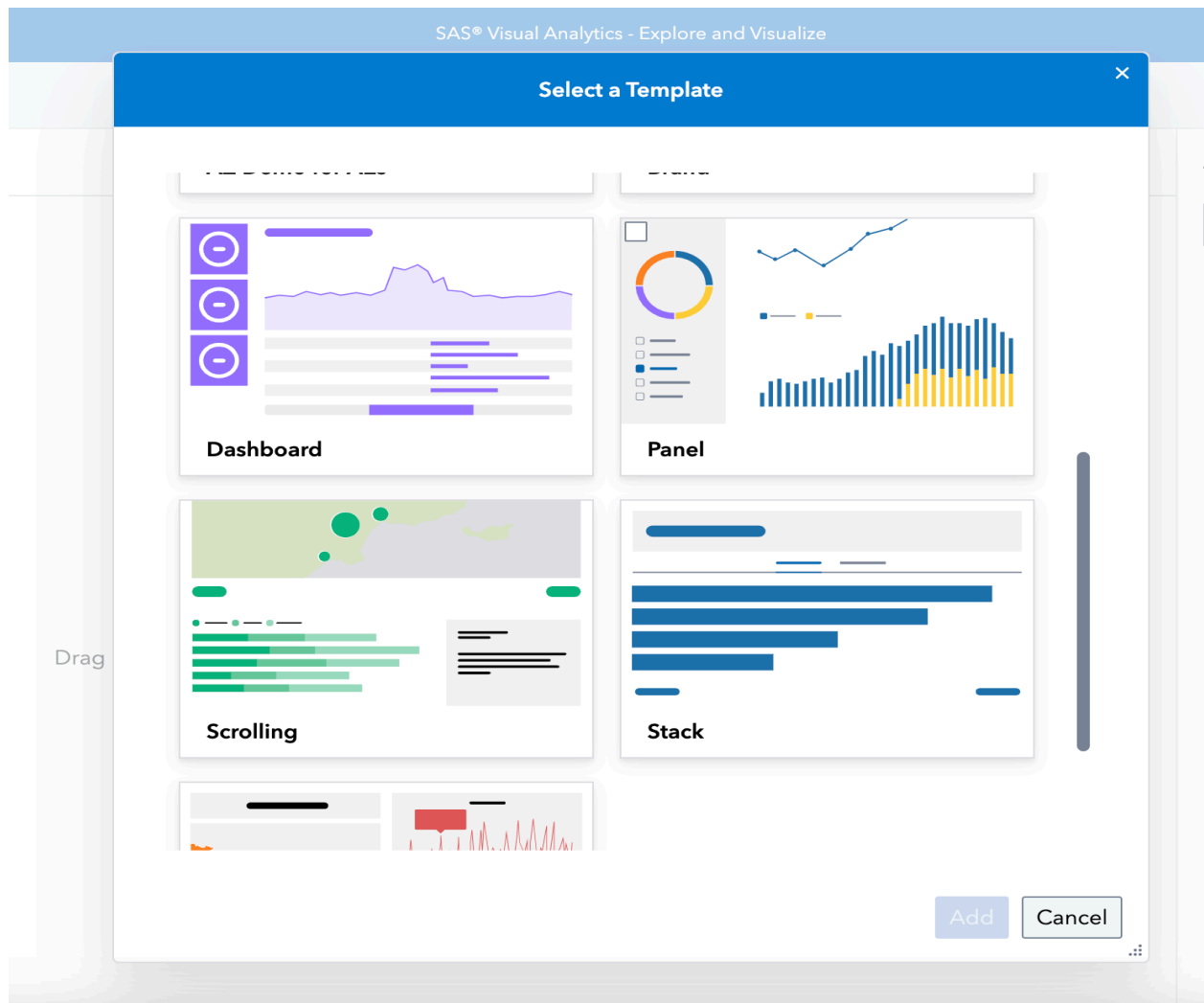


Figure 8: SAS Viya Templates

Point-and-click web applications are another instance of self-service BI. You can create online applications and dashboards using SAS Viya that are accessible via a web browser. Viya offers tools and features to help you design a user interface for your application. By organizing widgets and other visual

components, you can create the layout for your online application. In **Figures 9 and 10**, you see a web application and the generated insights of a Randomization List for a clinical trial.

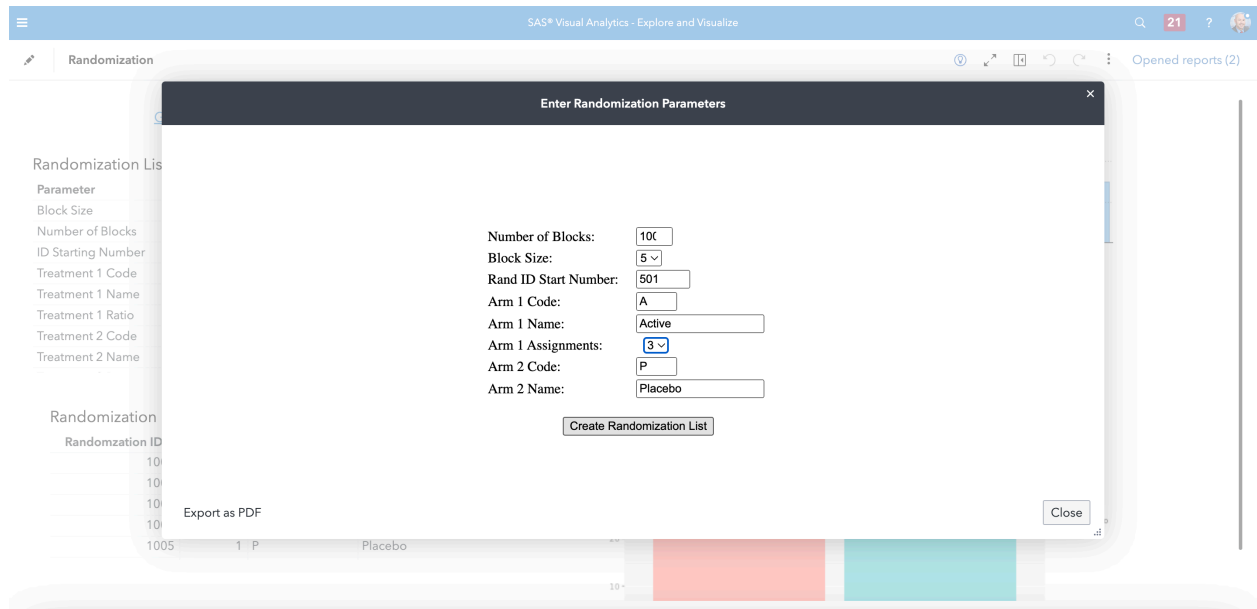


Figure 9: Randomization Web Application

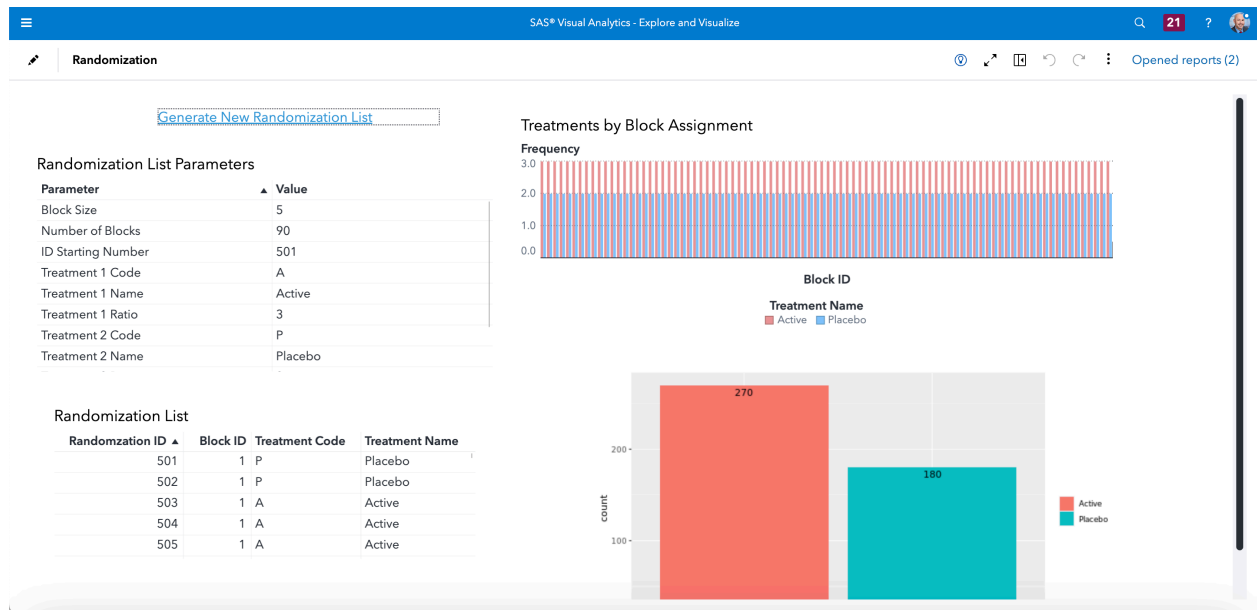


Figure 10: Randomization List Insights

MACHINE LEARNING INTEGRATION

The machine learning capabilities of SAS are seamlessly integrated with SAS Viya. The development of prediction models, classification algorithms, and AI-driven analytics is made possible by this integration, which improves research outcomes and speeds up the drug discovery process.

EXAMPLE BENEFITS IN LIFE SCIENCES

ACCELERATED DRUG DISCOVERY

By examining molecular data, the findings of high-throughput screening, and information from clinical trials, SAS Viya assists researchers in discovering prospective medication candidates. Analytics and visualizations offer perceptions into the efficacy, interactions, and side effects of medications.

PERSONALIZED MEDICINE

SAS Viya aids in the creation of individualized treatment programs by fusing patient records and genetic data. Genetic indicators linked to disease risk and medication response can be found by researchers, allowing for customized therapies.

CLINICAL TRIAL OPTIMIZATION

The platform uses data on patient demographics, recruitment rates, and trial results to optimize clinical trial design. The early detection of adverse events and the identification of trends that affect trial success are made easier by visualizations.

REGULATORY COMPLIANCE

SAS Viya offers audit trails, data lineage, and secure data access controls to enable compliance with regulatory standards. To ensure data integrity and follow industry rules, this is essential.

REAL-WORLD USE CASES

MOTION ANALYTICS

Understanding and utilizing the power of motion analytics has become crucial for enterprises across numerous industries in today's data-driven world. The tools and capabilities provided by SAS Viya enable businesses to gain important insights from motion data.

What if we could use sensors, cameras, and an analytics platform to gather data and insights from your home? In the past, patients had to travel to a site, perform 14 tests in the Berg Balance assessment (e.g., turn 360 degrees), and have an individual subjectively rate ability. At SAS, we tested using a simple

sensor and camera to ingest real-time streaming data and calculate insights. **Figure 11** is a dashboard of an individual and rating their fall risk based on insights of data generated by the sensor and camera.

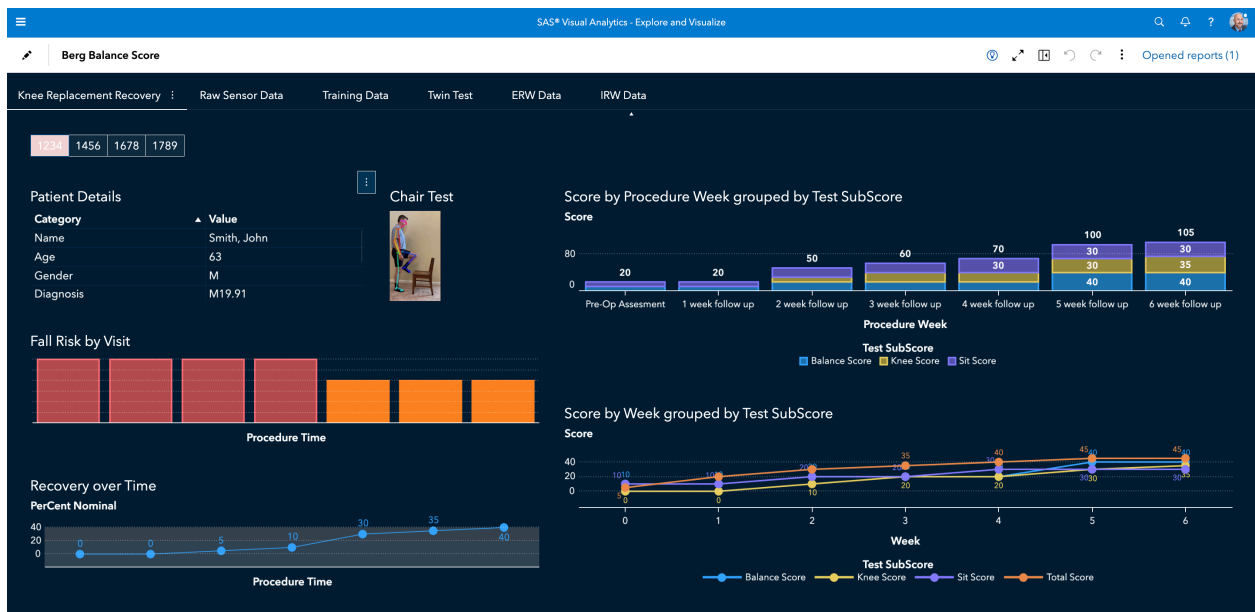


Figure 11: Motion Analytics Dashboard

We then applied a model which predicted the “closeness” of a patient’s data to one who had certain fall risks. Based on the plethora of data received from the sensor and camera we produced a score of the relative “likeliness” of this patient to those with fall risks. This is seen in **Figure 12**.

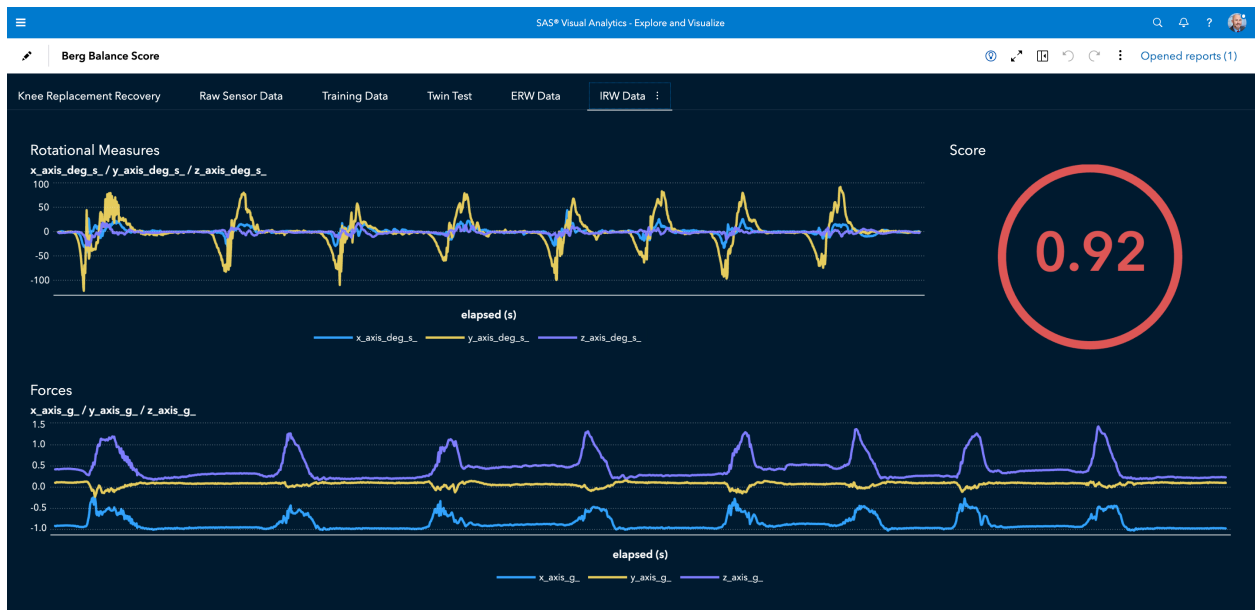


Figure 12: Model Application in Motion Analytics

GENOMIC DATA ANALYSIS

SAS Viya could be used by researchers at genomics institutes to examine huge genomic datasets. The technology can streamline the research process and accelerate discoveries by making it easier to identify genetic variants linked to uncommon diseases.

What if the biologist, data engineer, data scientist, bioinformatician, etc. all worked in the same platform? As a lab biologist, I do not have to wait for data off a DNA sequencer to flow to a data engineer who then fed that to a bioinformatician to spend hours analyzing the data to find chromosomes of interest. What if a Manhattan Plot of that data showed up to me nearly instantly (see **Figure 13**)? What if I could further drill down to individual single nucleotide polymorphism (see **Figure 14**)?

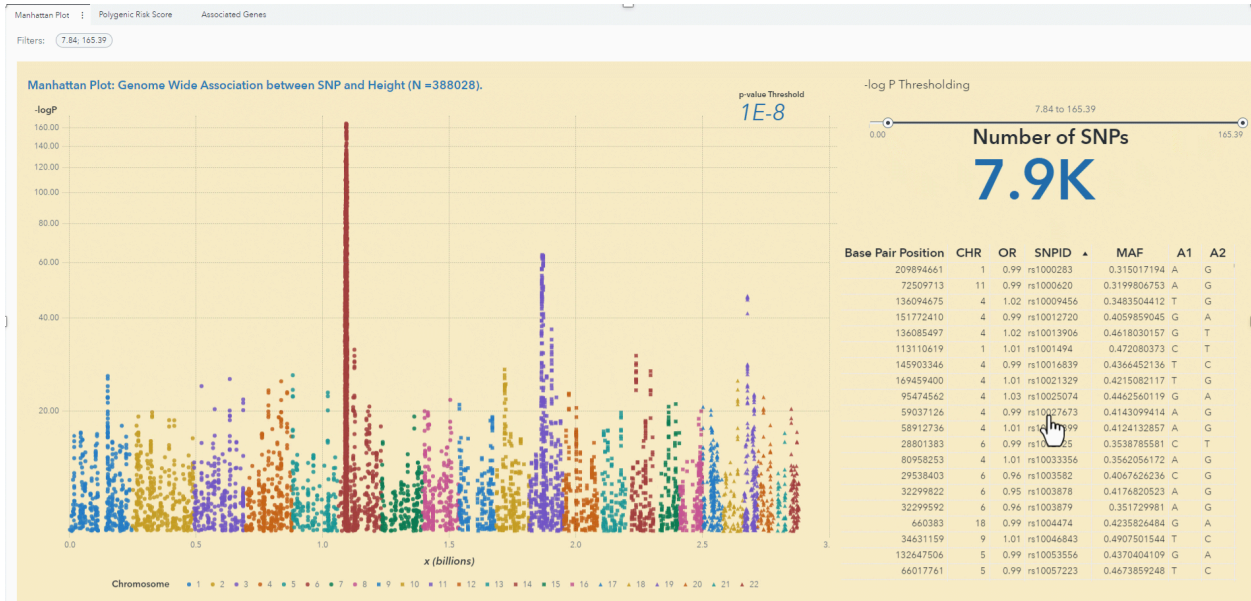


Figure 13: Manhattan Plot of Genomic Data

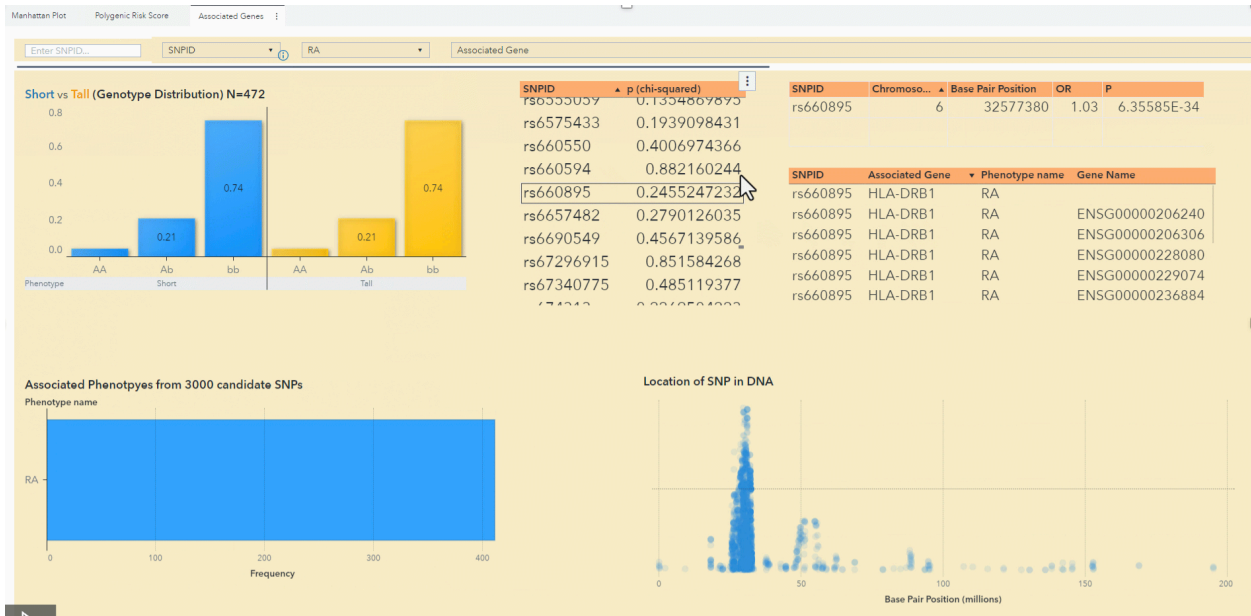


Figure 14: SNP Genomic Visualization

PHARMACOVIGILANCE

SAS Viya could be used by a pharmaceutical business to monitor adverse medication reactions by combining data from several sources. Safety officials can see trends and act quickly when there is a possible safety risk thanks to real-time dashboards.

CONCLUSION

SAS Viya emerges as a powerful tool in the life sciences sector, enabling researchers and professionals to extract meaningful insights from complex and diverse datasets. Its interactive data exploration, advanced analytics, and integration capabilities make it an asset for accelerating drug discovery, advancing personalized medicine, optimizing clinical trials, and ensuring regulatory compliance. As the life sciences industry continues to evolve, SAS Viya stands at the forefront of data-driven innovation.

REFERENCES

SAS Voices. 2019. "I applied AI to my arthritis assessment. Here's what happened." Accessed October 29, 2019. <https://blogs.sas.com/content/sascom/2019/10/29/i-applied-ai-to-my-arthritis-assessment-heres-what-happened/>.

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RECOMMENDED READING

- SAS® Visual Analytics: Getting Started with Reports (from SAS Support Pages)*
- SAS® Visual Analytics: Getting Started with Analytical Models (from SAS Support Pages)*
- Welcome to SAS® Visual Analytics (from SAS Support Pages)*

CONTACT INFORMATION

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