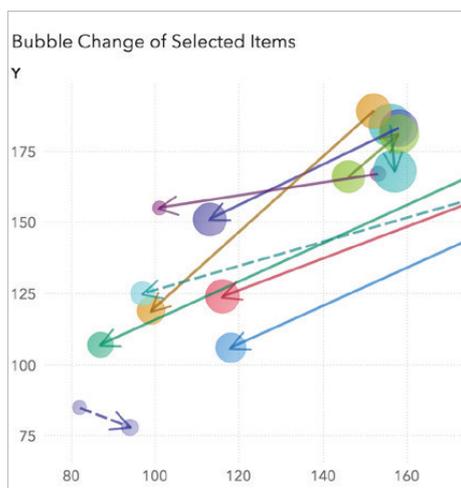




SAS® Visual Analytics for SAS® G-Cloud

Get self-service reports, visual discovery and approachable analytics all from a single, powerful in-memory, open, integrated and collaborative solution



What does SAS® Visual Analytics for SAS® G-Cloud do?

SAS Visual Analytics provides a modern, integrated environment for governed discovery and exploration. Users, including those without advanced analytical skills, can examine and understand patterns, trends and relationships in data. It's easy to create and share reports and dashboards that monitor business performance. Easy-to-use analytics and visualizations help everyone get insights from data to better solve complex business problems.

Why is SAS® Visual Analytics for SAS® G-Cloud important?

Users of all skill levels can visually explore data, use automated analysis and create visualizations while tapping into powerful in-memory technologies for faster computations and discoveries. This self-service solution scales to an enterprise wide level, putting data and analytics in the hands of more people. At the same time, governance capabilities help IT promote consistency and reuse.

For whom is SAS® Visual Analytics for SAS® G-Cloud designed?

It's designed for anyone in an organization who wants to create, share and collaborate on insights from data. That includes decision makers, business analysts, report creators and citizen data scientists. It also provides IT with an easy way to govern and manage data integrity and security.

More people than ever want to explore data and use analytics, even if they don't possess deep analytical skills. At the same time, IT staffs find it harder to meet the constant demands for data access and preparation, while also handling daily requests for ad hoc analyses and updated dashboards. As a result, decision makers are frustrated because it takes too long to get insights.

To help everyone get the answers they need when they need them, SAS Visual Analytics provides an intuitive interface that combines self-service reporting, data visualization and easy-to-use analytics. It takes advantage of the SAS Viya engine for even faster insights.

SAS Viya modernizes the SAS Platform with features like high availability for always-on answers, faster in-memory processing and native cloud support. Resilient and scalable, SAS Visual Analytics can handle more users, more data and a wide range of BI and analytical workloads in a consistent and governed manner.



SAS® Viya™

Benefits

- **Understand and share what's happening with dynamic visuals.** Create interactive reports and dashboards by querying data in a self-service manner. Then summarize and share key performance metrics via the web or mobile devices. Recipients can dynamically slice and dice to find answers or ask more questions as needed.
- **See the big picture and underlying connections.** Visually explore all relevant data smartly, quickly and easily. Interactive discovery lets you examine opportunities hiding in your data, while automated analysis highlights important relationships in data with easy-to-understand explanations. Business users can find out why something happened and identify critical drivers to make better decisions. The software discovers key relationships, outliers, clusters, trends and more, revealing insights that inspire action.
- **Drive business results with data-backed insights.** With easy-to-use predictive analytics, business users and analysts can assess possible outcomes and make better, data-driven decisions without programming.

Visualizations, smart algorithms and automated analysis reduce the need for experimentation, and you avoid the risk of missing key insights.

- **Add geographical context to your analyses and visualizations.** Combine traditional business data with location data to understand the full picture. Location analytics adds the “where” dimension, so you can analyze data in new ways, understand location factors and identify location-specific opportunities.
- **Share and interact with insights when and where you want.** Executives and frontline staff can quickly interact and collaborate with reports, charts and dashboards to better understand business performance, jointly interpret results and decide on the best actions. Content can be shared with others via the web and mobile devices.
- **Bring analytics in-house without the deployment challenges.** Spend your budget on the analytics team you want instead of support staff you need to support the hardware. With managed SaaS offerings on SAS Viya, you get a reliable platform along with the experts to support it. You avoid the time, risk and upfront costs of on-site deployment.



By telling your story, sharing and collaborating, you enhance the value and credibility of your results. These are more than just static reports. SAS Visual Analytics allows you to build reports that enable collaborative, engaging discussions that can drive deeper insights and better decisions.

Self-service discovery

With web-based exploratory analysis and other easy-to-use features, even users without analytical expertise can use SAS Visual Analytics to gain precise insights.

Non-technical users can create and change queries simply by selecting items from a sidebar or dynamically filtering and grouping data. Automated analysis determines which variables contribute to an outcome and a simple natural language explanation highlights essential insights. Auto charting selects the visualization that best suits the type of data chosen.

Analytically savvy users can use visualization techniques to spot trends and derive deep insights faster. This eliminates many of the everyday trial-and-error processes currently used to identify areas that need further analysis.

Self-service analytics for everyone

Analytical capabilities are tailored for ease of use, so business analysts can generate and use analytical models on their own without learning new skills or engaging IT. Business users get the answers they need when they need them, and specialists are not burdened with constant requests for analyses.

SAS Visual Analytics enables business analysts to quickly assess possible outcomes or estimate unknown parameters to support better decisions. Powerful, yet easy-to-use capabilities include:

- Automated forecasting. The most appropriate forecasting method is chosen to suit the data. Even novice users can forecast reliably.

Key Features

Self-service discovery

- Interactive discovery of relationships, trends, outliers, etc. for business users and analysts.
- Auto charting automatically chooses the graph best-suited to display selected data.
- Analytical visualizations include box plots, heat maps, animated bubble charts, network diagrams, correlation matrices, line charts with forecasting, parallel co-ordinates plots, donut charts, decision trees and more.
- Geographical map views provide a quick understanding of geospatial data.
- Network diagrams provide the ability to display networks across a map.
- Reuse and share modifications to your report, such as filters, calculations, hierarchies and report element formatting.
- Create calculated, aggregated or derived data items.
- A resizable overview bar lets you interactively subset a portion of visuals with many data points.
- Bring your own custom interactive visualizations (e.g., D3.js graphs, C3 visualizations or Google charts) into SAS Visual Analytics, so they're all driven by the same data.
- Key value visualization allows you to display important metrics (numeric or categorical value) in an infographic style for quick reference.
- Perform path analysis (Sankey diagrams) to visualize relationships between a distinct sequence of events.
- Drag an Excel file, CSV or SAS data set onto your workspace and quickly start building reports or dashboards.
- Automated analysis determines which variables contribute to an outcome and provides a simple natural language explanation that is easy to understand.

Self-service analytics:

- Create drillable hierarchies in a self-service manner without the need to predefine user paths.
- Add cell visualizations, like bars and heat maps, to your tables to quickly identify problem points and see trends in your data.
- Forecasts can be generated on the fly with forecasting confidence intervals included.
- Measure details to help you quickly get a feel for your data.
- The most appropriate forecasting model is automatically selected after running multiple models against data.
- Scenario analysis lets you see how changes in different variables would affect forecasts.
- Goal seeking lets you to specify a target value for your forecast, and then determines the values of underlying factors that would be required to achieve the target value.
- Decision trees graphically depict likely outcomes. An expert level allows you to modify certain influencing parameters for the tree generation.
- Custom binning for moving continuous data into a small number of groups for better interpretation and presentation of results.
- Text analysis capabilities enable you to automatically find topics and understand sentiment from text sources, including Facebook, Twitter, Google Analytics, YouTube comments and more.

- Scenario analysis. Identify important variables and how changes to them influence forecasts.
- Goal seeking. Determine the values of underlying factors that would be required to achieve the target forecast.
- Decision trees. Create a hierarchical segmentation of the input data based on a series of rules applied to each observation.
- Network diagrams. See how complex data is interconnected.
- Path analysis. Visualize relationships between a distinct sequence of events. Path analysis displays the flow of data from one event to another as a series of paths.
- Text analysis. Applying sentiment analysis to YouTube videos, Twitter streams, Facebook posts, Google Analytics data or customer comments provides fast insight into what's being discussed in social media and beyond. SAS Visual Analytics provides more than simple word clouds that display how many times a word is used. Content categorization determines which topics are most important and identifies sentiments of topics and documents to provide clear paths for further exploration.

Interactive dashboards, reports, BI and analytics - all from a single interface

Go beyond the scope of typical business intelligence solutions. With SAS Visual Analytics, you can move directly from reporting and exploration to analysis and sharing information through different channels - all from the same user interface.

As more people have access to data and to analytics applied to the data, it's increasingly important for people to have conversations about their BI dashboards and reports.

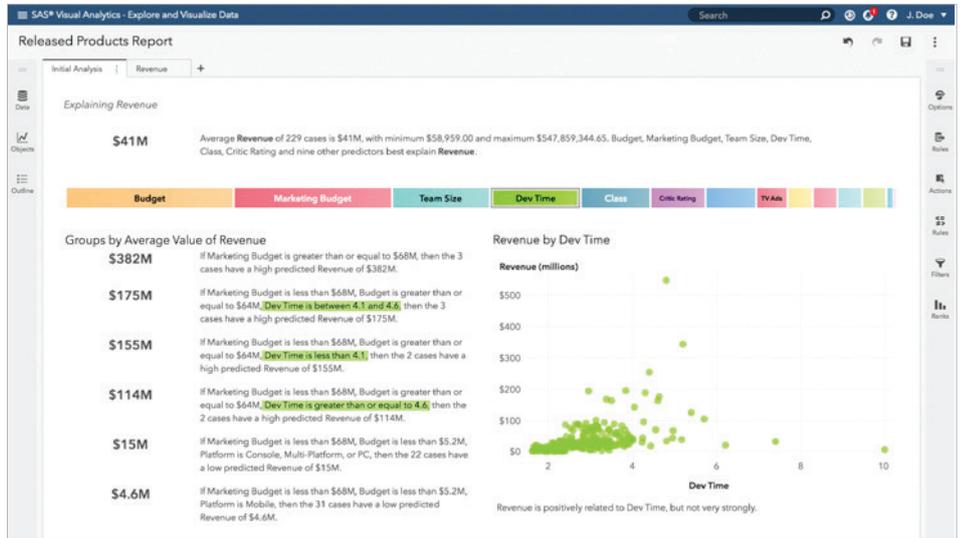


Figure 3: Automated analysis determines which significant variables affect key business measures, reducing time spent on data discovery and improving response time.

Key Features (continued)

Interactive reporting and dashboards

- Precision and responsive layout capabilities provide flexibility in report layout and design. Stack or group items and more.
- A variety of graph objects or charts are included: bar with multiple lines, pie, donut, line, scatter, heat map, bubble, animated bubble, treemap, dot, needle, numeric series, schedule chart, vector, etc.
- Add content from the web (e.g., YouTube videos, web apps) and images (e.g., logos) to your report.
- A variety of prompt controls help you interact with reports.
- Custom sort allows you to rank order category data items in a table or graph by characteristics (e.g., products, customers). The characteristics that are most important to your organization will be displayed first.
- One-click filtering (e.g., one way, bidirectional) and linked selections will allow you to spend less time manually linking content (e.g., visualizations, reports).
- Text objects can include date-driven or system-generated text for relevant context.
- Collaborate across mobile devices and the web by adding comments to a report.
- Synchronize selection and filters across visualizations in a report or dashboard.
- Link different reports (e.g., link a sales report to an inventory report).
- Report consumers can change calculation parameters and display rules using controls, filters, etc. to see information that is most relevant to them.
- Create alerts for a report object so that subscribers are notified via email or a text message when the threshold condition is met.
- Set refresh rates for individual objects, pages or your entire report.
- Distribute reports as PDFs or email in a secure manner. Distribute reports once or at recurring intervals, such as daily, weekly or monthly.
- Recover reports you are editing when your session ends unexpectedly. Reports are automatically saved every five seconds after an edit is made.

These conversations are critical for understanding and interpretation, for alignment and decision making. One way to facilitate conversations around the data is to put information where people can easily get to it, including the web, Microsoft Office applications and mobile devices.

SAS Visual Analytics reduces the number of tools your teams use and the number of systems IT must maintain.

SAS® Visual Analytics app for mobile devices

Sharing and collaboration relies on reaching decision makers no matter where they are. With SAS Visual Analytics, they can use native apps for Windows 10, iOS and Android to quickly view dynamic reports and dashboards on tablets and smart phones. Users can annotate, add comments and email reports to others. Email alerts can be sent to notify users when reports are updated, or data is changed. The SAS Visual Analytics app is available for free from the Microsoft Store, Apple App Store® and Google Play. In addition, create your own custom mobile apps using the SAS SDK for iOS and SAS SDK for Android.

Key Features (continued)

- Pick up where you left off from a prior session on all your devices.
- Playable dashboards let you put your report in slideshow mode.
- Administrators can configure support for guest access to view report or visualization. Guest users can view the insights that are available to the public.

SAS® Visual Analytics mobile app

- Install the free SAS Visual Analytics app (formerly SAS Mobile BI) from the App Store for iOS iPhone and iPad, Google Play for Android phones and tablets, and Microsoft Store for Windows 10 devices.
- The app lets you connect and interact with your SAS Visual Analytics reports and dashboards using gestures native to your devices.
- Interact with your SAS Visual Analytics app for iOS using voice commands.
- Reports created once in SAS Visual Analytics can be viewed anywhere.
- Secure access to content on mobile devices, both online and offline.
- Annotate, comment, share and email reports to others for increased collaboration.
- Screenshots can be captured, and comments shared with others.
- Notifications alert business users when a report is updated, data is changed, or the application is updated.
- Create your own mobile apps using the SAS SDK for iOS and SAS SDK for Android to create embedded insights:
 - Personalize your mobile app with embedded SAS Visual Analytics content, your corporate logo and name of your choosing.
 - Preconfigure your mobile app to connect to SAS servers and subscribe to specified reports.
 - Develop completely customized mobile apps that embed SAS Visual Analytics content (e.g., GatherIQ).
 - Manage and secure your mobile app and data by integrating with mobile device management (MDM) service (via new APIs).

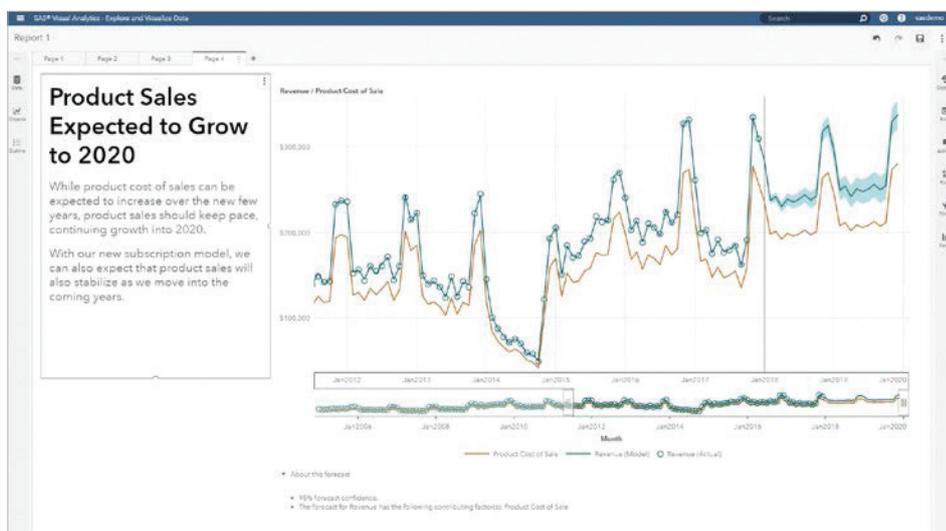


Figure 4: Use goal seeking to see how changes to a forecast affect underlying factors, and use scenario analysis to see how a forecast is influenced by changes to underlying factors.

Location analytics

Location data has long been collected and used for GIS and mapping purposes. Urban planners, law enforcement and real estate companies have been using geographical data for years. But with more and more location data being collected from smart phones, smart watches, iBeacons and sensors, interest in location analytics is growing in almost every industry.

Location analytics is more than just putting points on a map. It's about augmenting location information with other data and analytics to produce deeper insights. With SAS Visual Analytics, you can combine traditional data sources, such as transactional, customer and operational, with location and demographic data for analysis in a geographical context. You can analyze data in new ways, understand opportunities and risks, and visually engage with the information for more informed decision making.

Now you can add map pins to mark points of interest and insights on a map. For instance, a pin can be based on the result of a geosearch or you can simply select a location on a map to add a pin. From a pin, you can create a direct-line route to or from another pin and make a geographic selection with the pin at the center.

Data loading and self-service data preparation

Business users can take advantage of drag-and-drop capabilities to import their own data, join tables, apply data quality functions, create calculated columns and more.

The demand for self-service data preparation needs will increase as more users create interactive content, whether it's reports, dashboards or explorations. SAS Visual Analytics gives them the power to do so.

Key Features (continued)

- Geographic point clustering makes it easier to visualize high-volume location data and identify areas of interest. Get more or less details at different zoom levels.
- Add map pins to mark points of interest and insights on a map.
- With an Esri ArcGIS Online license, you can enrich your data with Esri demographics data:
- Starting from a pin, select the area that can be traveled based on travel distance or provided travel time.
- Create travel routes between points.
- Add latitude and longitude columns to your data based on location information in your data (country, state, ZIP code, city and street).

Self-service data preparation

- Import data from a variety of internet and PC sources such as Excel spreadsheets, clipboard, social media, etc.
- View lineage with network diagrams.
- Use basic data quality functions like change case; convert, rename, remove and split columns; and create calculated columns and transformations using custom code.
- New table and column profiling to understand data immediately.
- Prep data using append, join, filter and transpose functions.
- Reuse, schedule and monitor jobs.

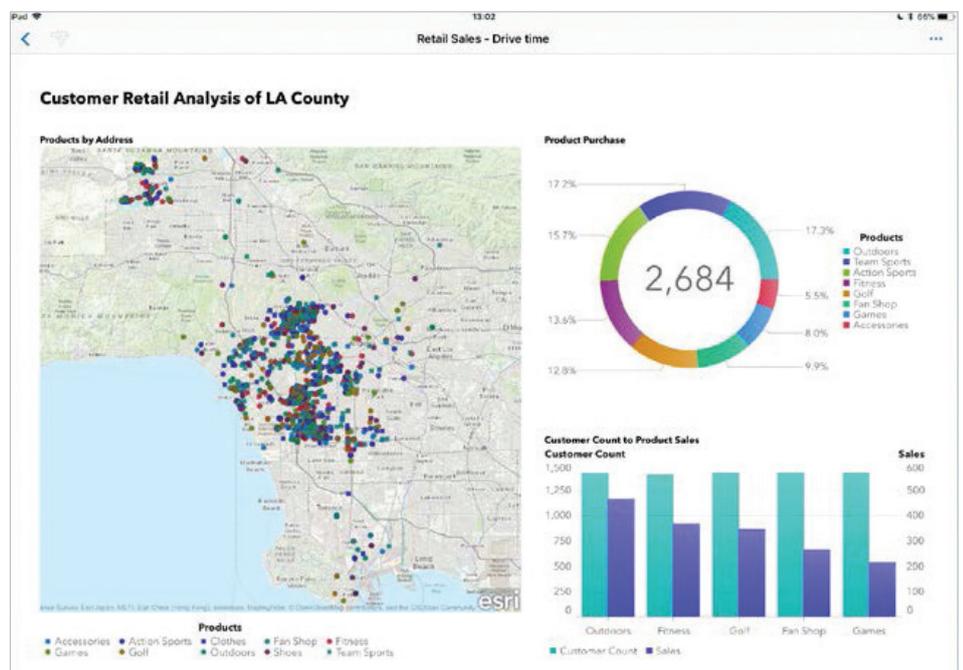


Figure 5: Interact with dynamic reports through the SAS Visual Analytics app, available for Windows 10, iPad®, iPhone®, Android tablets and smartphones.

Administration and management

The SAS Viya administration environment includes out-of-the-box audit and usage reports so administrators have direct access to monitoring and management capabilities. Data is automatically collected for all SAS Visual Analytics components, and administrative reports are created based on this data.

Highly scalable and distributed processing

SAS Visual Analytics takes advantage of SAS Viya to handle ever growing numbers of users, data types, data volumes, and the evolving range of BI and analytical workloads. It's designed for scalable, distributed processing so it's super responsive to changing needs.

The SAS Viya server called CAS (SAS Cloud Analytic Services) performs processing in memory. Data and intermediate results are held in memory as long as required, across jobs and user boundaries, reducing latency.

Open to other programming languages

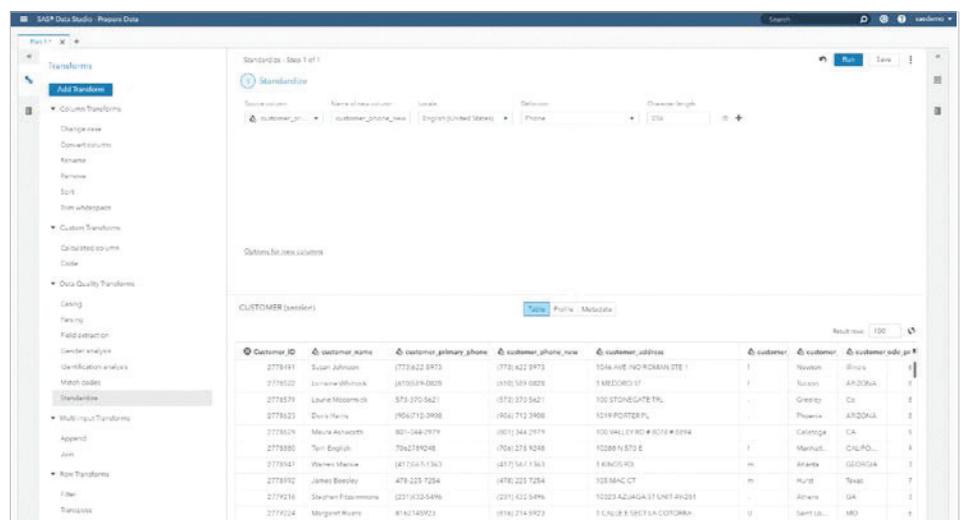
While SAS Visual Analytics is designed primarily for business users who prefer a visual interface, it does include a programming interface for those who want to write their own SAS code.

And if your programmers prefer to work in other languages, like Python, R, Lua or Java, that's OK too. They can call SAS Visual Analytics capabilities from their preferred programming environment. In addition, public REST APIs enable developers to easily add content created with SAS Visual Analytics to other applications.

Key Features (continued)

Administration and management

- See, organize and collaborate on your work using SAS Drive.
- Users can favorite, share, preview and tag their content from one place.
- Create projects that share data, content and other resources with project members.
- SAS Environment Manager provides easy-to-use, web-based centralized administration and monitoring of your BI and analytics environment, including users, data, content, servers, services and security.
- User authentication and content authorization support governance.
- Object-level security (folders, reports, etc.) and data security (table and row level) support governance.
- Rules-mapping application capabilities for users and groups support governance.
- Whitelist or blacklist mobile devices to determine authorization for SAS Visual Analytics apps.
- Near-real-time dashboard for monitoring system health and key activities.
- Scriptable APIs perform administrative tasks in batch, including management of security, libraries, users' groups and configurations.
- Customizable monitoring and performance reports.
- Environment wide log exploration, job scheduling and monitoring.



The screenshot shows the SAS Data Studio interface with a 'Standardize' transformation step. The table below represents the data being processed:

| Customer ID | customer_name | customer_primary_phone | customer_phone_new | customer_address | customer | customer_city | customer_state |
|-------------|---------------------|------------------------|--------------------|-----------------------------|----------|---------------|----------------|
| 2778191 | Scott Johnson | (773) 622 8973 | (773) 622 8973 | 1524 AVE IND ROXBURY STE 1 | 1 | Newton | MA |
| 2778192 | Lorraine Whitlock | (870) 589 0828 | (870) 589 0828 | 11 MIDWOOD ST | 1 | Lucas | AR |
| 2778193 | Laura Moore OS | (573) 370 5621 | (573) 370 5621 | 100 STONEGATE TRL | 1 | Greer | SC |
| 2778194 | Dora Harris | (954) 712 3908 | (954) 712 3908 | 1219 PORTER PL | 1 | Phoenicia | AR |
| 2778195 | Maura Anselotti | (801) 344 2979 | (801) 344 2979 | 100 VALLEY RD # 307E # 307A | 1 | Calverton | CA |
| 2778196 | Tari English | (706) 278 9248 | (706) 278 9248 | 10288 N 870 E | 1 | Marshall | GA |
| 2778197 | Walter Moore | (471) 561 1363 | (471) 561 1363 | 11 KINGS RD | 1 | Atlanta | GA |
| 2778198 | James Bentley | (478) 225 7284 | (478) 225 7284 | 102 MAC CT | 1 | Murk | VT |
| 2778199 | Stephen Fitzsimmons | (201) 622 5496 | (201) 622 5496 | 10323 AZULGA ST UNIT A1201 | 1 | Atlanta | GA |
| 2778200 | Margaret Moore | (818) 274 9923 | (818) 274 9923 | 1 CALIB B BSECT 1A CORDONA | 1 | Santa Ana | CA |

Figure 6: Prepare and load your data through a drag-and-drop interface where you can join tables, create calculated columns and more.

Service Model

SAS® Visual Analytics is provided as a Managed software as a service (SaaS), this is an advantageous way to help getting started with analytics, solving implementation problems with offerings that include software, hardware and hosting services for a contracted period. You load your data onto the SAS cloud environment and build your analytics.

SAS will run a secure, cloud-based service on your behalf, giving you the benefits of our most advanced software and scalable platform architecture - managed and supported by our own experts.

Each dedicated SaaS instance running SAS uses a predefined storage allowance to manage your data requirements and keep them secure and backed up. This solution is supported with ongoing management and administration. All these elements are backed by a 99 percent uptime warranty.

Our services are regularly reviewed and audited to ensure your data is secure and maintained according to national and international privacy legislation.

Our teams know how to get the most from the SAS Platform. With experience acquired across public, financial, health care and commercial sectors, they are familiar with common regulatory compliance requirements.

Key Features (continued)

SAS® Viya® in-memory engine

- CAS (SAS Cloud Analytic Services) performs processing in memory.
- User requests (expressed in a procedural language) are translated into actions with the parameters needed to process in a distributed environment. The result set and messages are passed back to the procedure for further action by the user.
- Data is managed in blocks and can be loaded in memory and on demand.
- If tables exceed memory capacity, the server caches the blocks on disk. Data and intermediate results are held in memory as long as required, across jobs and users.
- Includes highly efficient node-to-node communication. An algorithm determines the optimal number of nodes for a given job.
- Communication layer supports fault tolerance and lets you remove or add nodes from a server while it is running. All components can be replicated for high availability.
- Support for legacy SAS code and direct interoperability with SAS 9.4M5 clients.
- Supports multitenancy deployment, allowing for a shared software stack to support isolated tenants in a secure manner.

SAS® procedures (PROC) and CAS actions

- A programming interface (SAS Studio) allows IT or developers to access a CAS server, load and save data directly from a CAS server, support local and remote processing on a CAS server, write queries, perform basic data manipulation, etc.
- Python, Java, R or Lua programmers or IT staff can also access data and perform basic data manipulation against a CAS server or execute CAS actions using PROC CAS.
- With REST APIs, you can integrate and add the power of SAS to other applications.

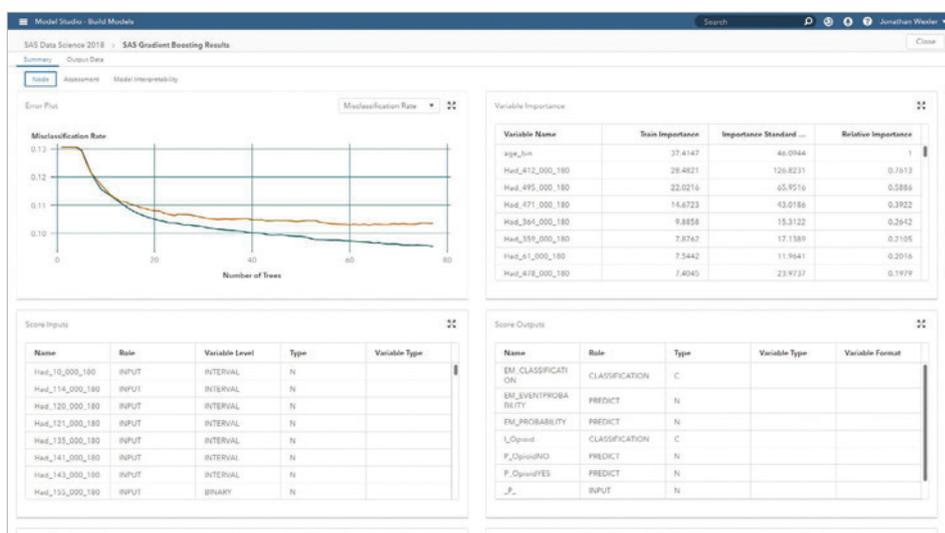


Figure 6: Model assessment features compare results from multiple algorithms to automatically identify champion models.

Service Deliverables

The managed SaaS offerings include the following service deliverables:

- Commissioning and provisioning of the predefined hosted infrastructure, including compute, network and storage.
- Preconfigured security and connectivity for users and data.
- Pre-installed software.
- Ongoing support with software administration and management.
- 99 percent uptime SLA.
- 30-minute incident response time for software availability issues.
- Data protection warranties and a documented data classification and handling process.
- Regularly scheduled backups.
- Patching and updates applied to SAS software when required

Key Features (continued)

Deployment options

- Primarily delivered as Software as a Service, further options are available to meet specific security requirements or to align with existing Cloud deployment strategies. These nonstandard options will be priced on application.
- On-site deployments:
 - Single-machine server to support the needs of small to midsize organizations.
 - Distributed server to meet growing data, increasing workloads and scalability requirements.
- Alternative Cloud deployments:
 - Enterprise hosting; private or public cloud (e.g., BYOL in Amazon, Azure or Google Cloud) or Platform as a Service such as Openshift and Cloud Foundry.

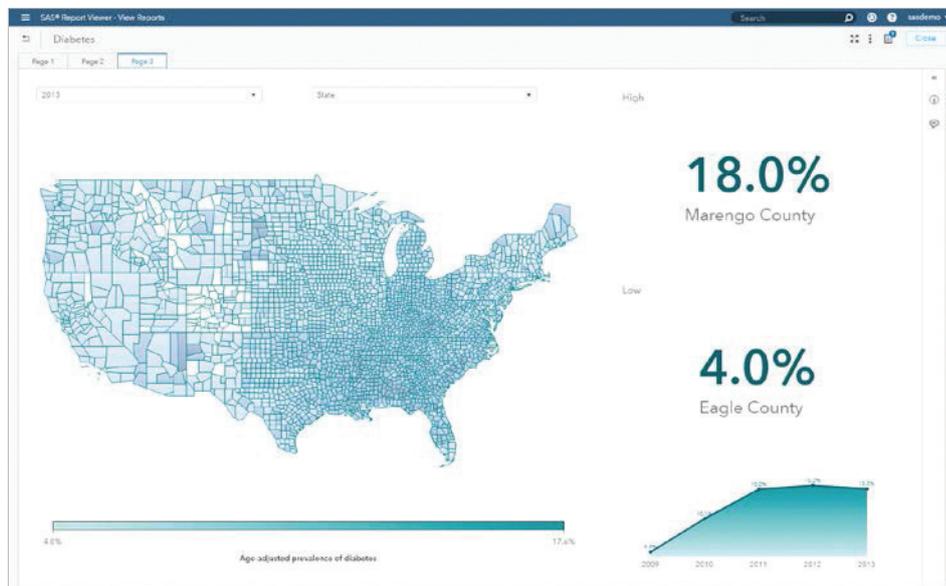


Figure 7: Easily augment geographical maps with location analytics for deeper, yet easy to understand, insights.

LEARN MORE >

To learn more about SAS Visual Analytics, download white papers, view screenshots and see other related material, please visit sas.com/va

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