

The objective of this tutorial is to get started with Data Viz and Machine Learning on SAS Viya, on small simple cases, using SAS Viya for Learners through SAS® Skill Builder.

After registration, we will start by using the Insight Toy case to discover how to use SAS Visual Analytics.

Then, we will then use Organics case to start Machine Learning.

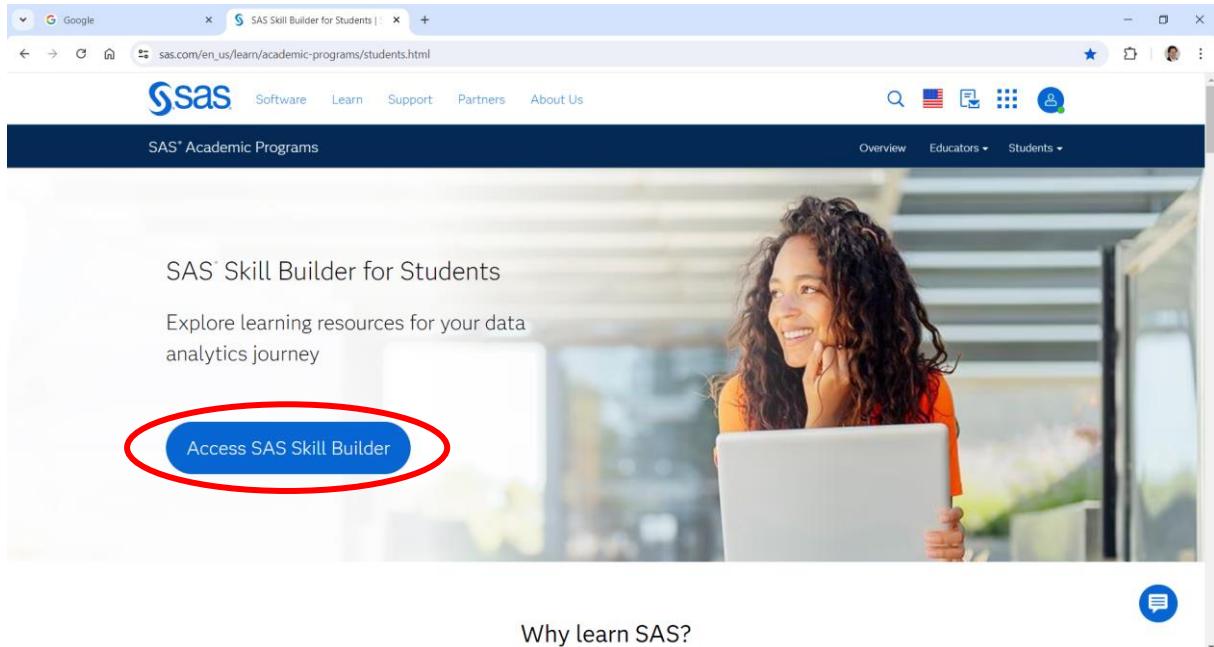
Welcome to the SAS® Skill Builder:	2
Changing browser language	7
Data Viz with SAS Visual Analytics Hands-On	9
Introduction to Insight Toy Company	9
Connect to Viya for Learners	11
Creating hierarchy and Crosstab	24
Create a geographical hierarchy	28
Create dashboards	34
Save your work	38
Export in pdf your work in pdf	39
Exercises	41
Machine Learning with Visual Analytics Hands-On	42
Big Organics	42
Data	42
Decision Trees	49
Logistic Regression	51
Gradient Boosting	53
Neural Network	54
Model Comparison	55
Score today table	59
Exercises	65
Videos :	66

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other brand and product names are trademarks of their respective companies.

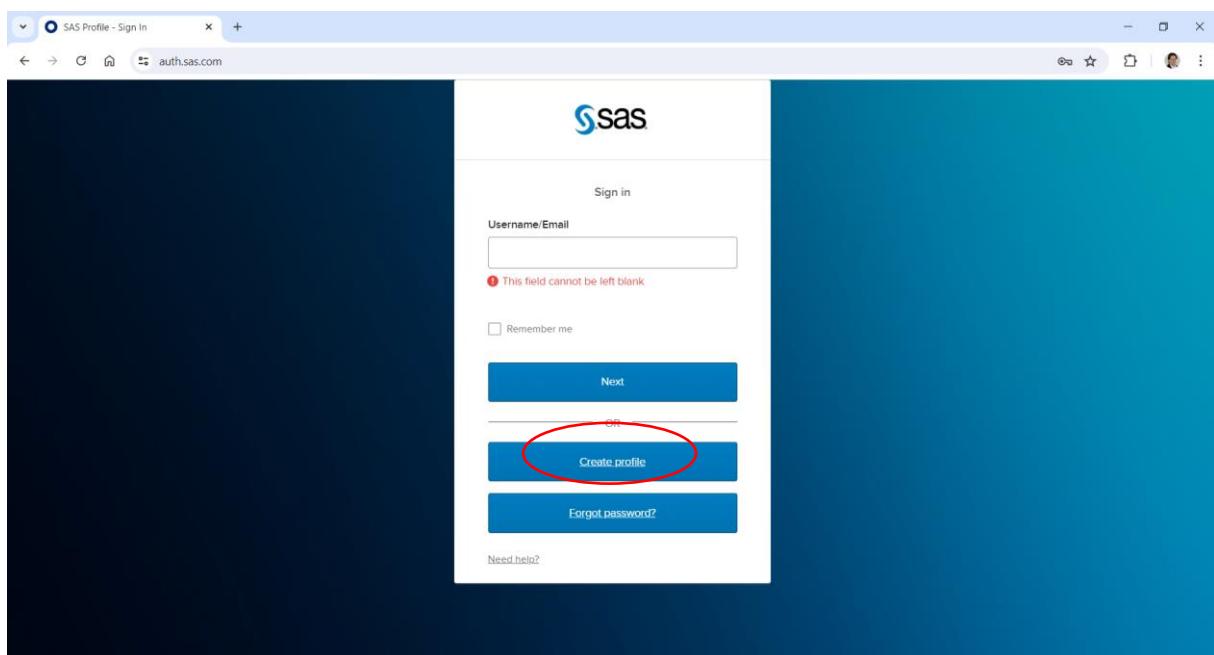
Welcome to the SAS® Skill Builder:

To get register, go to

https://www.sas.com/en_us/learn/academic-programs/students.html



Click on “Access SAS Skill Builder for Students”



If you don't have a profile with a valid university email address, you need to create one. Click on “Create Profile”

The screenshot shows the SAS Profile creation interface. At the top, it says "SAS Profile" and "sas.com/profile/ui/#/create". The main title is "SAS Profile" and the subtitle is "Step 1 of 2: Tell us about yourself.". The form fields include:

- Preferred Language: English
- First Name *: Grégoire
- Last Name *: de Lassence
- Email *: gregoire.delassence@lecnam.net
- Country/Region *: France

Register as a student. Use your e-mail from an academic institution.

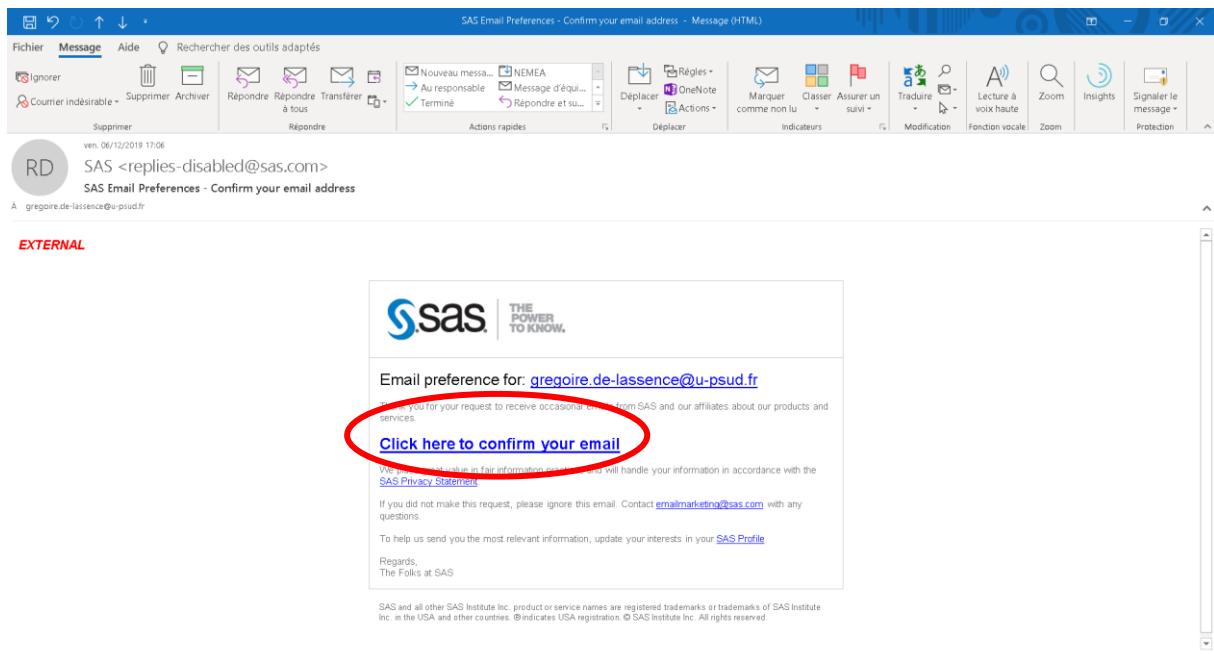
Accept the terms and click to on the box to create your profile

The screenshot shows the SAS Profile creation interface. At the top, it says "SAS Profile" and "sas.com/profile/ui/#/create". The form fields include:

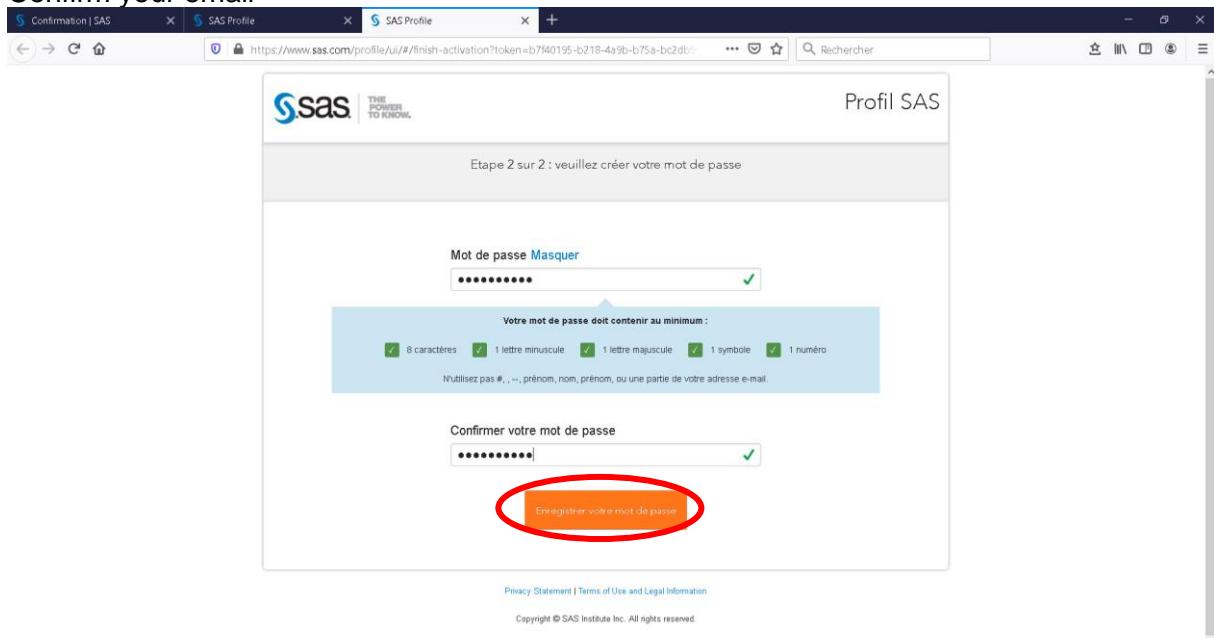
- Affiliation With SAS *: Student
- SAS Expertise Level *: Novice
- Organization/University *: Le CNAM

Below these fields is a note: "*Required". There is a checkbox for accepting terms and conditions, which is checked and circled in red. A note below the checkbox states: "Yes, I would like to receive occasional emails from SAS Institute Inc. and its affiliates about SAS products and services. I understand that I can withdraw my consent at any time by clicking the opt-out link in the emails." Below the checkbox is the text: "I agree to the terms of use and conditions. *". A note below that says: "All personal information will be handled in accordance with the SAS Privacy Statement." At the bottom is a large blue button labeled "Create profile" which is also circled in red. A note below the button says: "After clicking "Create profile," you will receive a verification email with".

After clicking "create profile" you must receive an email like the one below, to validate the address.



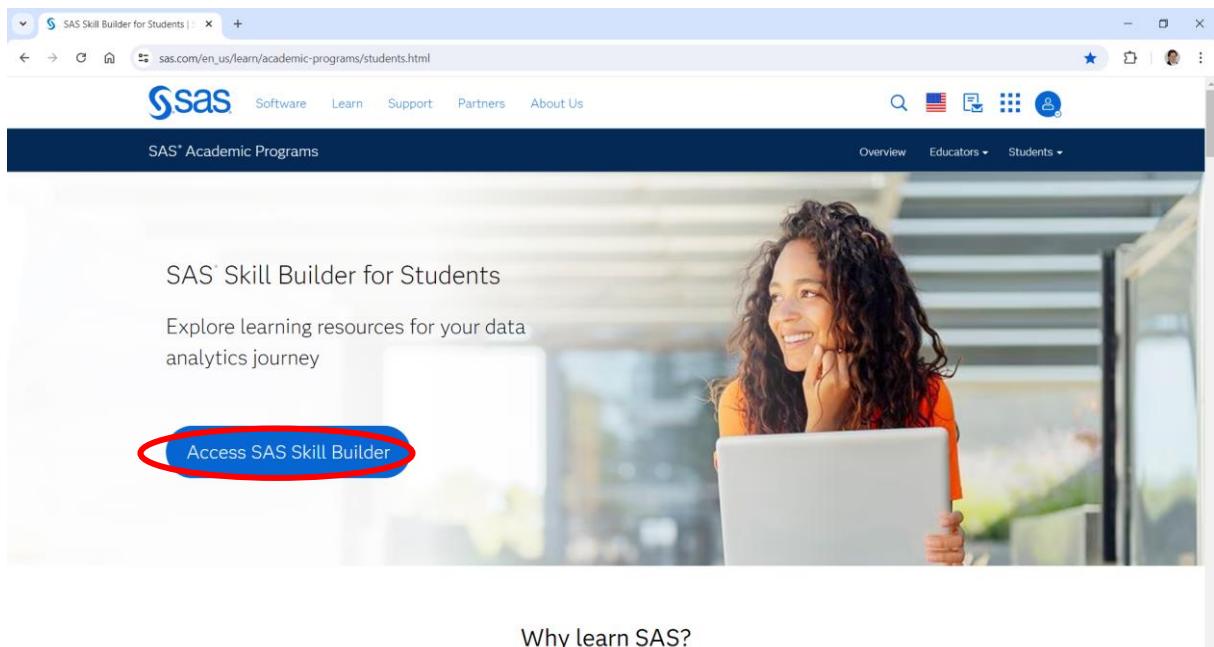
Confirm your email



Create a password and save it

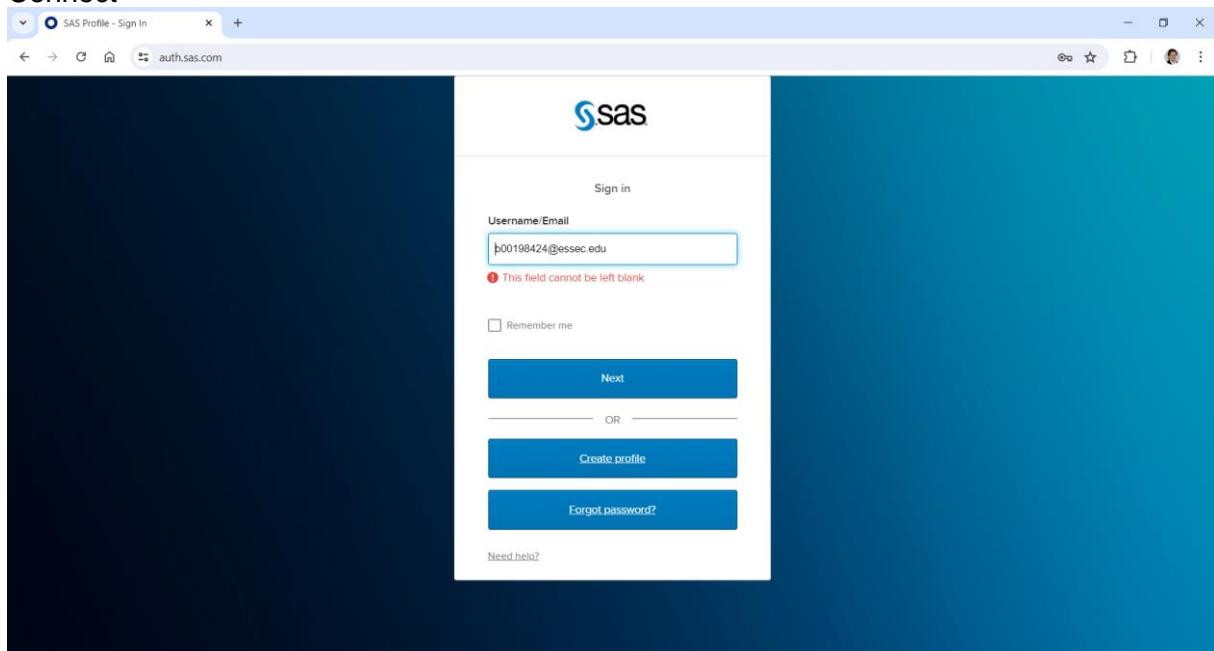
You must be able to connect to

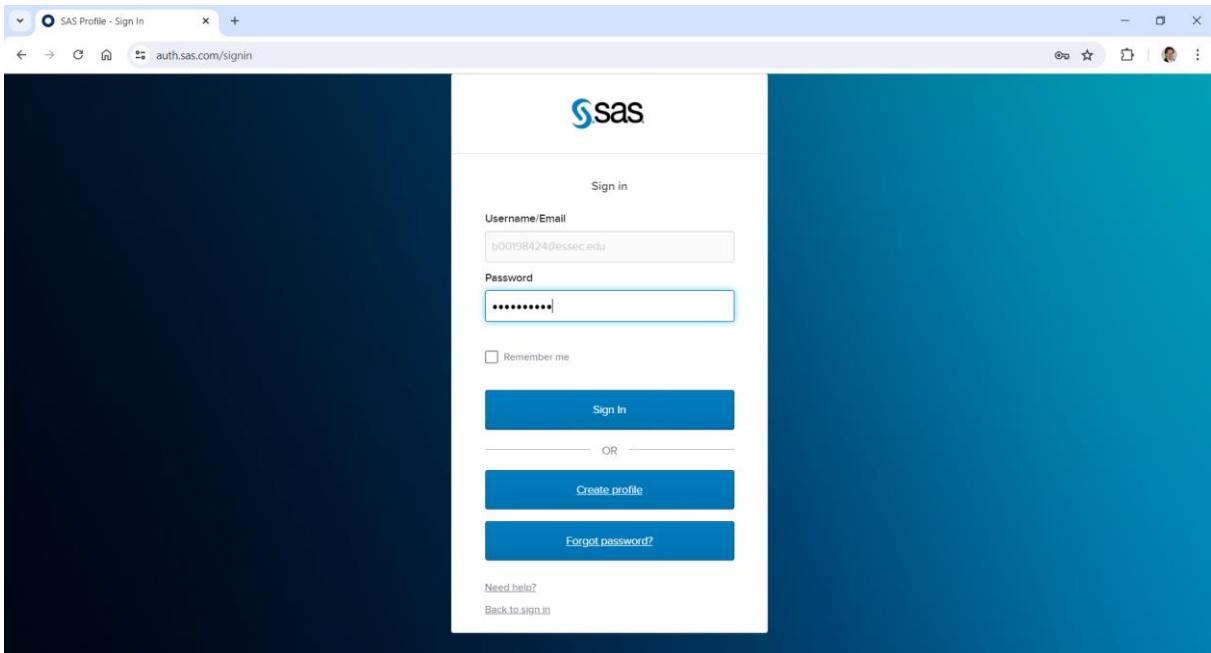
https://www.sas.com/en_us/learn/academic-programs/students.html



Why learn SAS?

Click on “Access SAS Skill Builder for Students”
Connect





Sign In

We're here to help. Alors que nous faisons face au COVID-19 ensemble, notre engagement envers vous reste fort. Si vous souhaitez développer des compétences essentielles à votre carrière, nous vous invitons à suivre nos formations en ligne gratuites ou à vous inscrire à des cours en classe connectée. Suivez le cours avec un formateur SAS et des machines virtuelles pour pratiquer en temps réel, comme dans une salle de formation.

Formation Sélectionnez votre formation Rechercher My Training Panier +33 1 60 62 11 00 Contactez-nous

• **Training**

- Accueil
- Trouvez votre formation
- Certification
- Offres de formation
- Discounts
- Centre de formation
- Conditions générales
- Tutorials gratuits

• **SAS Books**

My Training

Activate Your Product(s)

Listed below you will find the product(s) you can activate. Once you accept the license agreement and click submit, you will be able to access your products at any time using the "My Training" link as long as you are logged in using your SAS profile. If you want to use a different profile, save the activation code and come back to this page when you are ready to activate.

SAS Skill Builder for Students

License Agreement

Important: Merci de lire attentivement les termes et conditions du contrat de licence ("Agreement"). En cochant la case "J'accepte", vous vous engagez à respecter les conditions.

Yes I accept the License Agreement

You must accept the License Agreement in order to complete your activation of any training items.

Submit

Accept the terms

Welcome to SAS Skill Builder

The screenshot shows the SAS Learn: GAP_EducatorPortal website. At the top, there's a navigation bar with links for Accueil, Programmes, Formation en entreprise, Mes formations, and a shopping cart icon. On the left, a sidebar titled 'MY LIBRARY' has a 'In Progress' tab selected, showing options like Learning Paths, Certification, Live Classes, and Resources. The main content area displays 'IN PROGRESS' courses: 'SAS Certified Associate: Applied Statistics for Machine Learning' and 'SAS Viya for Learners'. To the right, there's a 'EDUCATOR' section with 'Teaching Kits' and 'Classroom Activities'.

Changing browser language

In order to have the application in English, you can put your browser setting in English.
In Chrome, go to settings (parameters) and advanced settings (advanced parameters)

The screenshot shows a Google Chrome browser window with the address bar set to 'google.fr'. A context menu is open from the three-dot menu icon in the top right corner. The 'Paramètres' option is highlighted with a red circle. The menu also includes other options like 'Nouvel onglet', 'Nouvelle fenêtre', and 'Téléchargements'.

The screenshot shows the 'Paramètres' (Settings) page in Google Chrome. The left sidebar has sections like 'Google et vous', 'Saisie automatique', 'Confidentialité et sécurité', 'Apparence', 'Moteur de recherche', 'Navigateur par défaut', and 'Au démarrage'. A red circle highlights the 'Langues' (Languages) link under 'Paramètres avancés' (Advanced). The main content area is titled 'Langues' and shows 'français (France)' as the selected language. A red circle highlights the three-dot menu icon next to the language name. Below it, 'anglais (États-Unis)' is listed with two checkboxes: 'Afficher Google Chrome dans cette langue' (Display Google Chrome in this language) and 'Proposer de traduire les pages dans cette langue' (Offer to translate pages in this language). Other languages listed include 'français', 'anglais', and 'Ajouter des langues' (Add languages). At the bottom, there's a toggle switch for 'Me proposer de traduire les pages qui sont écrites dans une langue que je ne connais pas' (Offer to translate pages written in a language I don't know) and another for 'Correcteur orthographique' (Spelling checker). The spelling checker options are 'Correcteur orthographique de base' (Basic spelling checker, selected) and 'Correcteur orthographique amélioré' (Improved spelling checker).

In Language
Move English (United States) [en-us] up to the top

Data Viz with SAS Visual Analytics Hands-On

Introduction to Insight Toy Company

We will start with a 1.6 million lines and 57 columns (2GB) table, on the fictitious company "Insight Toy".

This company produces and sells high-tech toys. We have data on 8 years, from 1998 to the end of 2005, on the financial, production, distribution, sales and marketing aspects.

Field	Description
Customer	Unique customer ID (over 80,000 customers).
Facility	Facility (127) - sales office, or manufacturing location.
Facility City	City where the facility is located.
Facility Continent	Continent where the facility is located.
Facility Country	Country where the facility is located.
Facility Opening Date	Used to calculate the Facility Age
Facility Region	Region (within a country) where the facility is located.
Geography Hierarchy	A hierarchy made up of Continents, Countries, Regions, Cities and Customers
Order	Order ID number for a sales.
Product	Product ID number. A product belongs to one product style (see below).
Product Brand	2 product brands: "Novelty" and "Toy".
Product Line	8 product lines. A line belongs to one product brand (see above)
Product Make	71 product makes. A make belongs to one product line (see above).
Product Style	335 product styles. A style belongs to one product make (see above).
Products Hierarchy	A hierarchy that was created to drill down from product brands to line, make, style and product ID.
Sales Rep	ID of the sales representative that made the sale.
Transaction Date	Date of the sale, from January 1 st , 1998 to December 31 st , 2012.
Transaction Month	Month and year of the sale, from January 1998 to December 2012.
Transaction Weekday	Day of the week when the sale happened ("Monday", "Tuesday", etc).
Transaction Year	Year of the sale, from 1998 to 2012.

Field	Description
Unit	Manufacturing unit that was used to assemble that product. There are 166 units in total.
Unit Status	Status of the manufacturing unit (eg. "Active", "Failure", etc). There are 5 possible status.
% Gross Margin	A percentage of gross margin, calculated by dividing Gross Margin by Product Sale for each transaction.
Customer Distance	Distance from the customer address to the nearest sales facility. Anywhere from 100 meters to 50 kilometers.
Customer Satisfaction	An evaluation of the customer satisfaction, at the time of the sale. Scores vary from about 20% (very low satisfaction) all the way to 100%.
Facility Age	Age of the facility, from 0 (brand new) to about 32 years old.
Facility Efficiency	An evaluation of the efficiency of the facility's operations, based on multiple management factors. Scores vary from 30% to 100%.
Product Cost of Sale	Product Cost of Sale. The purchase and production cost of the product sold.
Product Material Cost	The raw material component of the Cost of Sale.
Product Price (target)	The standard ideal product price – if the product was deemed 100% quality and the market conditions were ideal, this is what the Product Sale price would be set at.
Product Quality	An evaluation of the manufacturing quality of the product. Scores vary from 60% to 100%.
Product Sale	The actual revenue of the sale of that product.
Sales Rep Customer Base	Amount of potential revenue for all possible customers in a given sales representative's region.
Sales Rep Customers	Number of customers a sales representative is responsible for at a given date.
Sales Rep ID	ID of the sales representative who made that sale.
Sales Rep Rating	The internal organization's evaluation of the performance of a sales representative.
Unit Actual	Products produced from a given manufacturing unit at that point in time.
Unit Age	Age of a manufacturing unit.
Unit Capacity	Maximum production capacity of a given unit for a given period.
Unit Discard Rate	A percentage representing the number of products discarded for quality reason, divided by the unit target (see below).
Unit Lifespan	A ratio represented by 100% minus (age of the manufacturing unit divided by its theoretical lifespan).
Unit Lifespan Limit	The Unit Lifespan (see above) point at which a facility replaces manufacturing units.
Unit Reliability	A ratio representing how reliable a manufacturing unit is. It is made up of products discarded for quality reasons, divided by total amount of products assembled by the unit, for a given time period.
Unit Target	Products that should be produced from a given manufacturing unit at that point in time.
Unit Yield Rate	A ratio of products produced ('Unit Actual') vs. that should be produced ('Unit Target')

Connect to Viya for Learners

https://www.sas.com/en_us/learn/academic-programs/students.html

The screenshot shows a web browser window with the URL https://www.sas.com/en_us/learn/academic-programs/students.html. The page has a dark blue header with the SAS logo and navigation links for Software, Learn, Support, Partners, and About Us. Below the header is a dark blue bar with the text "SAS® Academic Programs" and "Overview", "Educators", and "Students". The main content area features a large photo of a woman smiling while using a laptop. To her left, there's a white box with the text "SAS® Skill Builder for Students" and "Explore learning resources for your data analytics journey". A blue button labeled "Access SAS Skill Builder" is highlighted with a red oval. Below the photo, the text "Why learn SAS?" is followed by a blue speech bubble icon.

Click on “Access SAS Skill Builder”

Sign-up

The screenshot shows a web browser window with the URL <https://learn.sas.com/my/>. The page has a dark blue header with the SAS logo and navigation links for Accueil, Programmes, Formation en entreprise, Mes formations, and a shopping cart icon. The main content area is titled "MY LIBRARY" and shows a sidebar with "In Progress" sections for Learning Paths, Certification, Live Classes, and Resources. The main area displays four course cards under "IN PROGRESS": "SAS Certified Associate: Applied Statistics for Machine Learning", "SAS Viya for Learners", "SAS® Programming I: Essentials", and "SAS® Visual Analytics 2 for SAS® Viya®: Advanced". To the right, there's a "EDUCATOR" section with three items: "Teaching Kits", "Classroom Activities", and "Free Software for Learners". The "Free Software for Learners" item is circled with a red oval.

Click on “Free Software”

SAS Academic Software | SAS

sas.com/en_us/learn/academic-programs/software.html

SAS® Academic Programs

Overview Educators Students

• Quickly launch a browser-based programming environment using SAS Studio.

• Learn SAS programming from basic to advanced techniques using coding or point-and-click tasks.

• Sharpen your analytics skills in data preparation, descriptive analyses and advanced statistical methods.

• Access the technology via the cloud and get up to 5GB of data storage.

[Access SAS OnDemand for Academics](#)

FREE FOR STUDENTS · EDUCATORS · INDEPENDENT LEARNERS

• Use an integrated suite of interactive visual interfaces for learning data science.

• Master artificial intelligence, text analytics, and machine learning on a big data computing platform.

• Access a preconfigured JupyterLab interface for R and Python integration with SAS.

• Get course materials to help educators build cutting-edge analytics curricula.

[Access SAS Viya for Learners](#)

FREE FOR STUDENTS & EDUCATORS

Explore More Free Resources

Go to “SAS Viya for Learners”

SAS Viya for Learners | SAS

sas.com/en_us/software/viya-for-learners.html

SAS® Viya® for Learners

Software Learn Support Partners About Us

Teach and learn leading-edge data science skills

To access this product, please sign in with your university email.

[Access for educators](#) [Access for students](#)

SAS Viya For Learners

Access for Students

SAS® Viya® for Learners

Build a complete advanced analytics program - from entry-level to doctorate - with a single software environment.

[Launch Software](#) [Access JupyterLab](#)

[Access SAS Viya for Learners 3.5 >>](#)

[Helpful Tips](#) [Additional Information](#)

Launch SAS Viya for Learners

User License Agreement

Important: Please carefully read the terms and conditions of this License Agreement for the SAS® Viya® for Learners ("Agreement") before clicking on the "Accept" button. By clicking on the "Accept" button, you ("You"), are agreeing to the terms and conditions of this Agreement, and SAS Institute Inc. ("SAS") will grant you access the hosted environment to use SAS® Viya® for Learners hosted environment (collectively, the "Service"). Your access to and use of the Service is expressly conditioned upon your acceptance of the Agreement. In the event You have received access to the Service through your academic institution or employer, Your use of the Service means You are agreeing to the terms and conditions of the Agreement. If You do not agree to all of the terms of this Agreement, click on the "Decline" button and/or do not use the Service.

1. License Grant. Pursuant to this Agreement, SAS grants You a nonexclusive, nonassignable, nontransferrable, fee waived, and royalty-free license to use the Service and any related documentation available at the link provided by SAS ("Documentation"). This Agreement become in effect as of the date You accept it or begin using the Service, whichever occurs first ("Effective Date").

If You are a student or an independent learner, You may use the Service solely in conjunction with Your participation in courses developed and taught by a degree-granting institution or courses delivered by SAS and offered via an on-line learning platform. If You are an educator employed by a degree-granting institution, You may use the Service solely to create and/or teach courses for such degree-granting institution. You may not use the Service or Documentation or allow any other person or entity to use the Service or Documentation for the purpose of investigating, supporting, threatening or filing any intellectual property infringement claim against SAS or its affiliates or for the purpose of developing an offering or product directly or indirectly competing with an offering or product from SAS.

You will not download or attempt to download any SAS software, data or other materials made available by SAS via the Service. You may use the Documentation solely in support of Your authorized and licensed use of the Service. Except to the extent allowed by law, You may not use the Service or Documentation or allow any other person or entity to use the Service or Documentation for the purpose of investigating, supporting, threatening or filing any intellectual property infringement claim against SAS or its affiliates or for the purpose of developing an offering or product directly or indirectly competing with an offering or product from SAS.

Your use of SAS' online area to access the Service includes the ability to enter into agreements and/or to make transactions electronically. You acknowledge that Your online activities in this area, including proceeding to access the Service, constitute Your agreement and intent to be bound by such agreements and transactions.

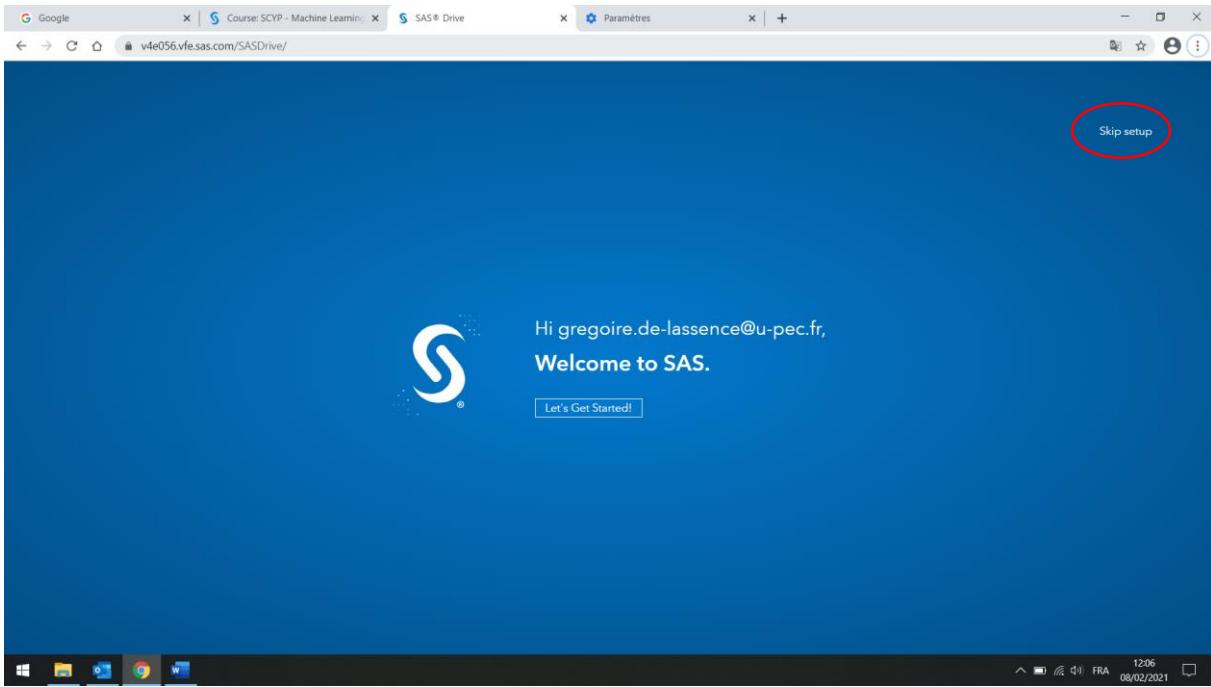
2. Your Responsibilities. You agree to bear Your own costs in connection with this Agreement, including, but not limited to, establishing an appropriate electronic connection between computers located at SAS' facility and Your computer, if needed. You shall take reasonable precautions to secure any such connection and Your computer facilities including, but not limited to, networks, extranets and web sites; in order to protect them from unauthorized access and use.

3. Access and Security. You acknowledge that SAS permits access to the Service via unique User ID(s) and password(s) ("Access Credentials"). You acknowledge and agree that Access Credentials are SAS' confidential and proprietary information. SAS may require that You register for a profile on SAS' website in order to obtain Access Credentials. You will provide current, accurate and complete information as requested in connection with the profile registration process. You are solely responsible for maintaining the confidentiality of Your Access Credentials. You will take all steps necessary to protect the Service from unauthorized use, disclosure or third party access, including, but not limited to, not disclosing the URL supplied by SAS or Your Access Credentials to anyone else. You will notify SAS immediately of any unauthorized use of Your Access Credentials.

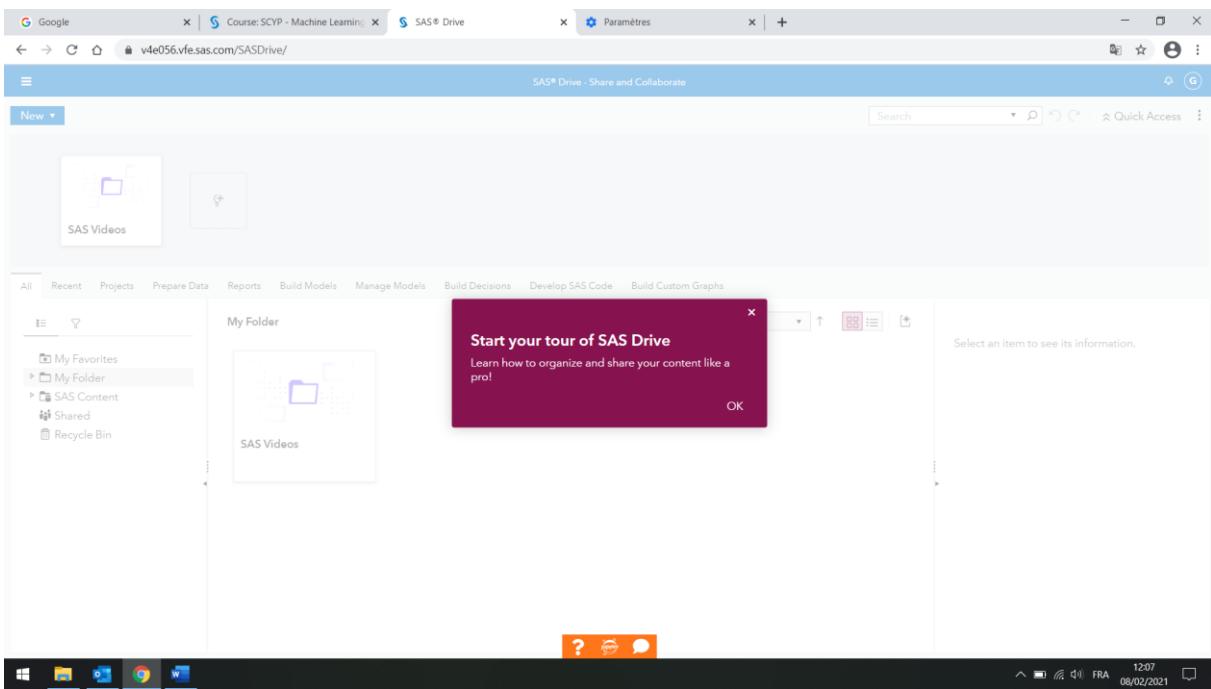
4. Your Materials. Any materials You provide, store, collect, transmit or receive for use with the Service and any materials You direct SAS to provide, store, collect, transmit or receive via the Service are defined herein as "Your Materials". You will transmit Your Materials to SAS using only methods that have been designated by SAS for that purpose.

[Accept](#) [Decline](#)

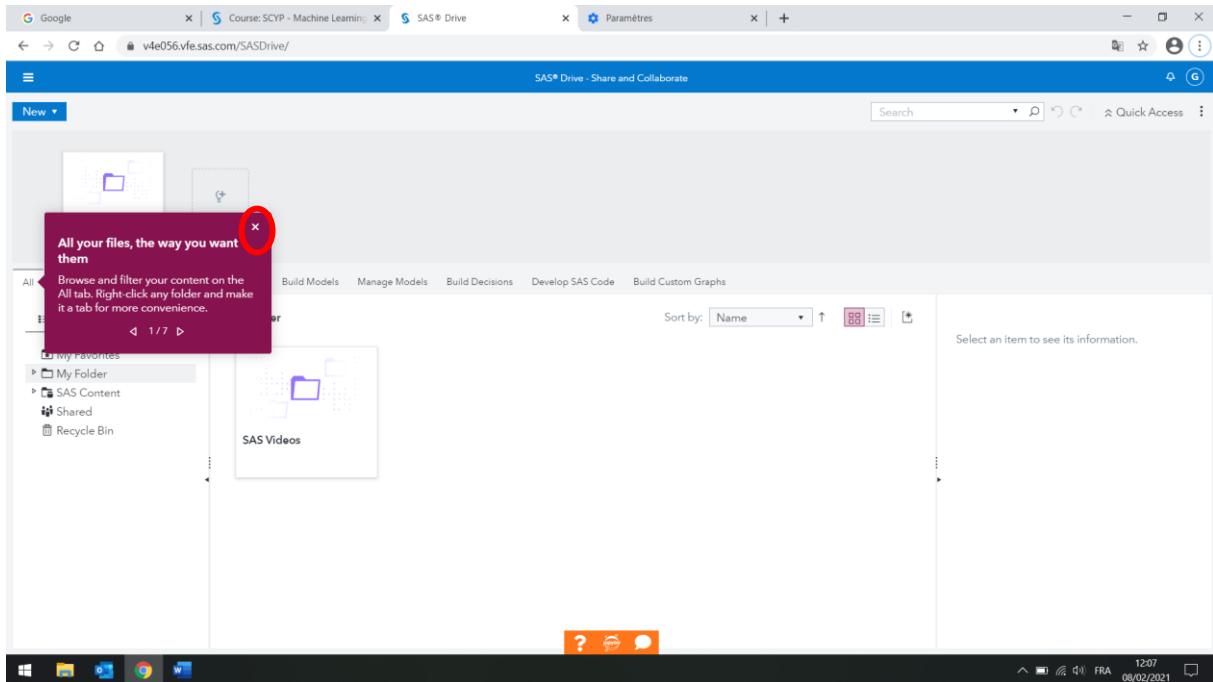
Accept



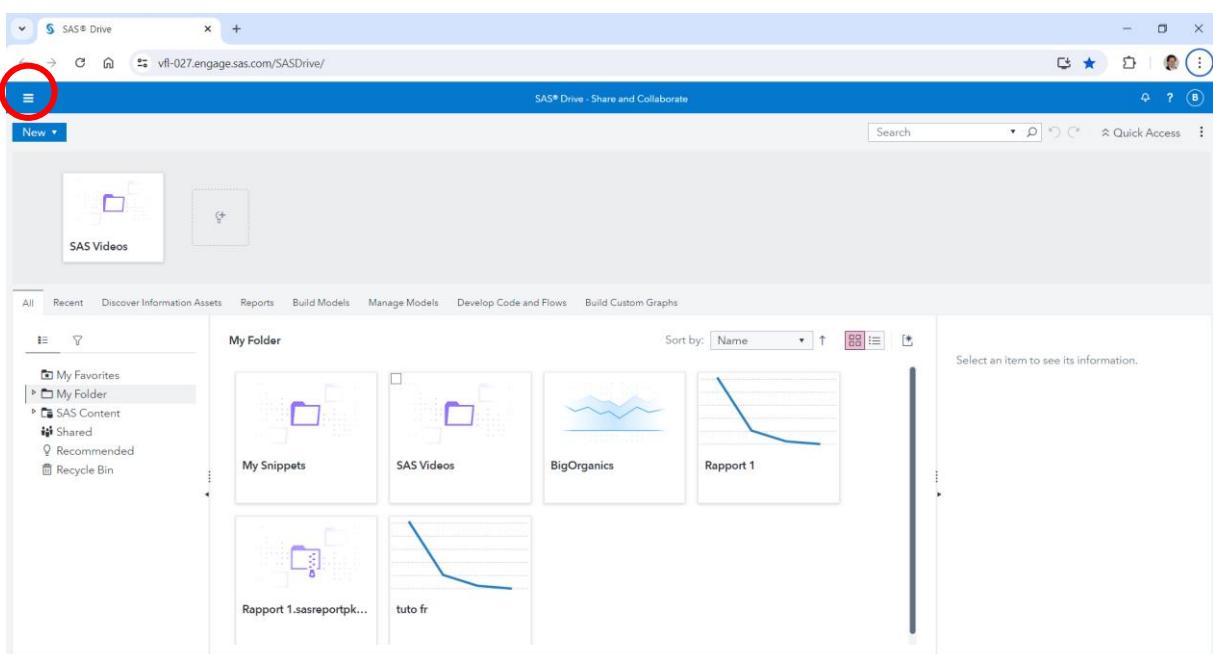
You can ignore the configuration: Skip setup



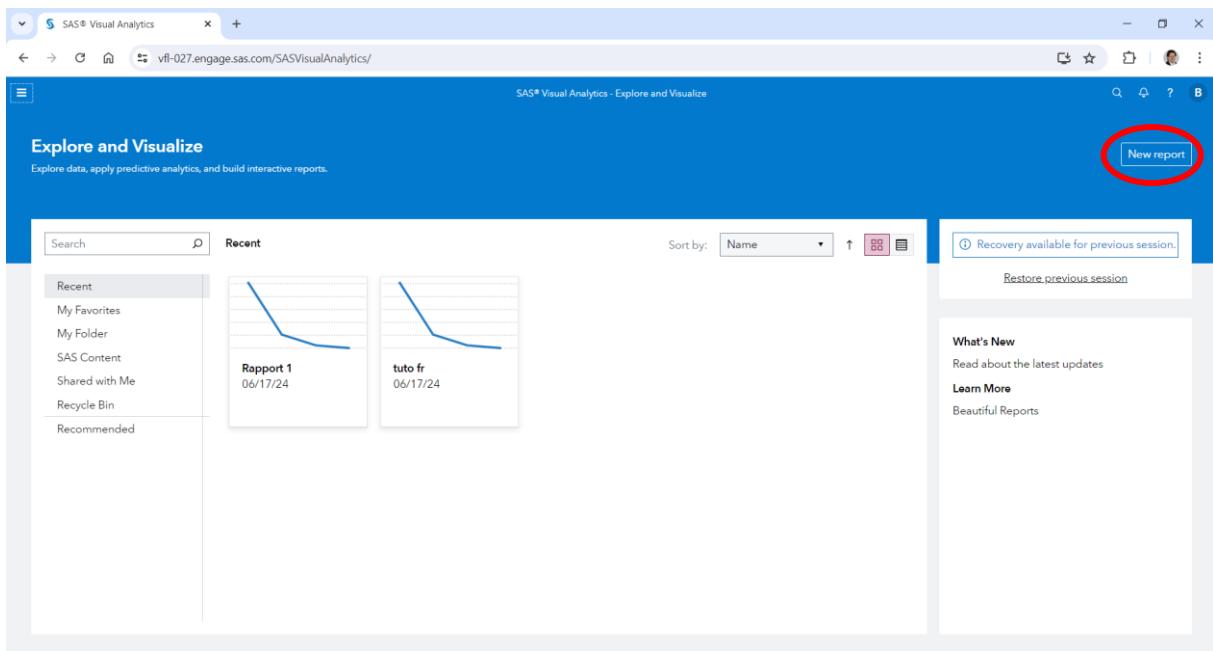
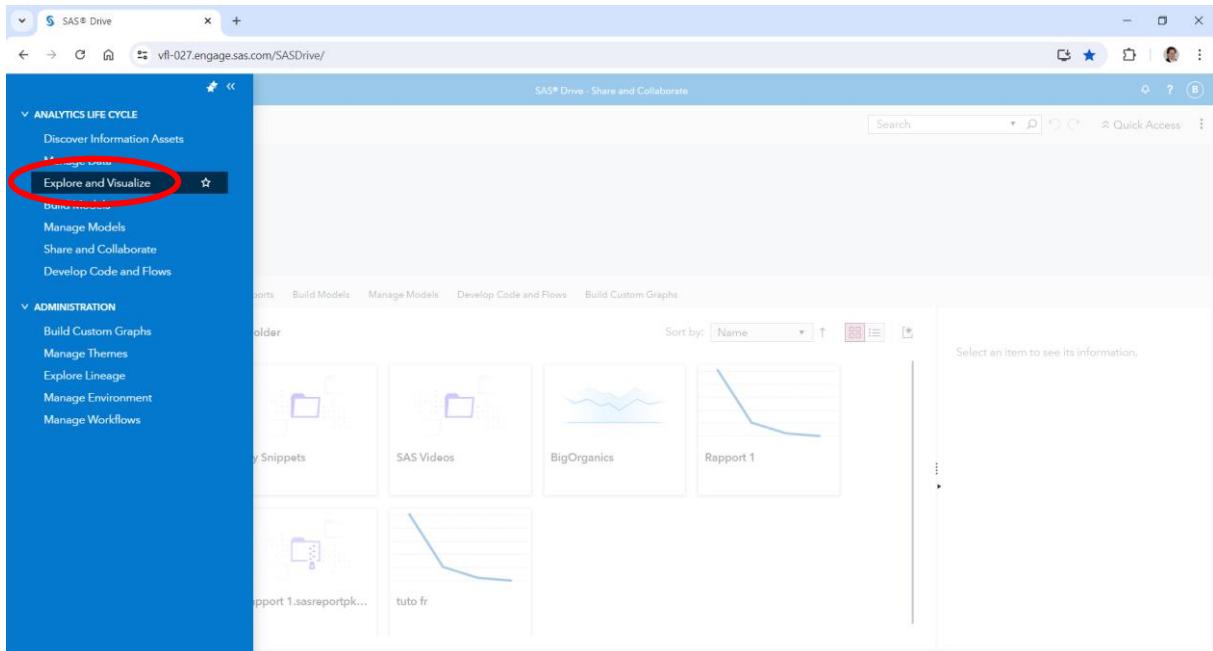
OK



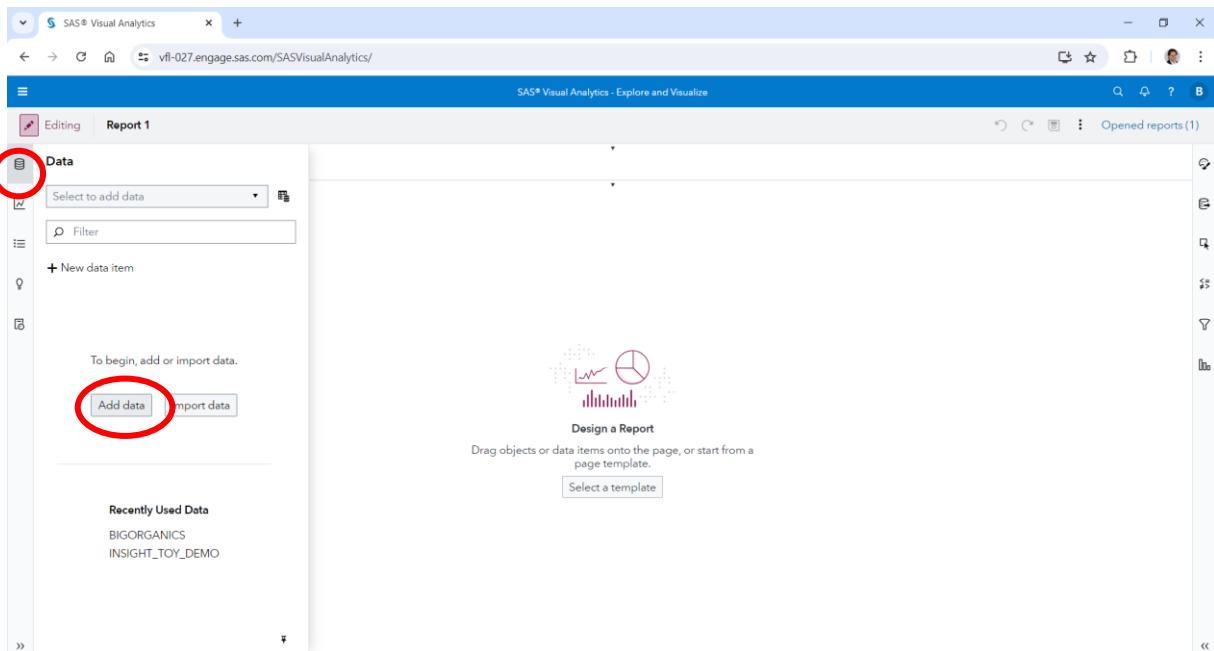
Close



Once in the SAS Viya for Learners - Drive, on the three small lines at the top left, select "Explore and Visualize Data"



New report



Add data

The screenshot shows the 'Choose Data' dialog box. In the search bar, 'ins' is typed. The results list shows 1-15 of 15 entries. One entry, 'INSIGHT_TOY_DEMO', is highlighted with a red circle. To the right, a detailed view of this table is shown, including its library ('TUNDATA'), columns (57), and properties like asset type ('In-memory data'). At the bottom right of the dialog, a blue 'Add' button is circled in red.

Select the table `Insight_Toy_Demo`.

OK

The screenshot shows the SAS Visual Analytics reporting interface. On the left, there's a sidebar titled 'Data' with a dropdown set to 'INSIGHT_TOY_DEMO'. A red circle highlights this dropdown. Below it is a 'Filter' input field and a '+ New data item' button. Under the 'Category' heading, there's a list of items with counts: Customer - 39K, Facility - 99, Facility City - 99, Facility Continent - 4, Facility Country - 18, Facility Opening Date - 14, Facility Region - 68, Order - 180K, Product - 1.6M, Product Brand - 2, Product Line - 8, Product Make - 71, Product Style - 335, and Sales Rep - 874. To the right, there's a 'Design a Report' section with three icons: a bar chart, a line chart, and a pie chart. Below the icons is the text 'Design a Report' and 'Drag objects or data items onto the page, or start from a page template.' There's also a 'Select a template' button.

This is the reporting interface.

On the left are data, objects and report content management.

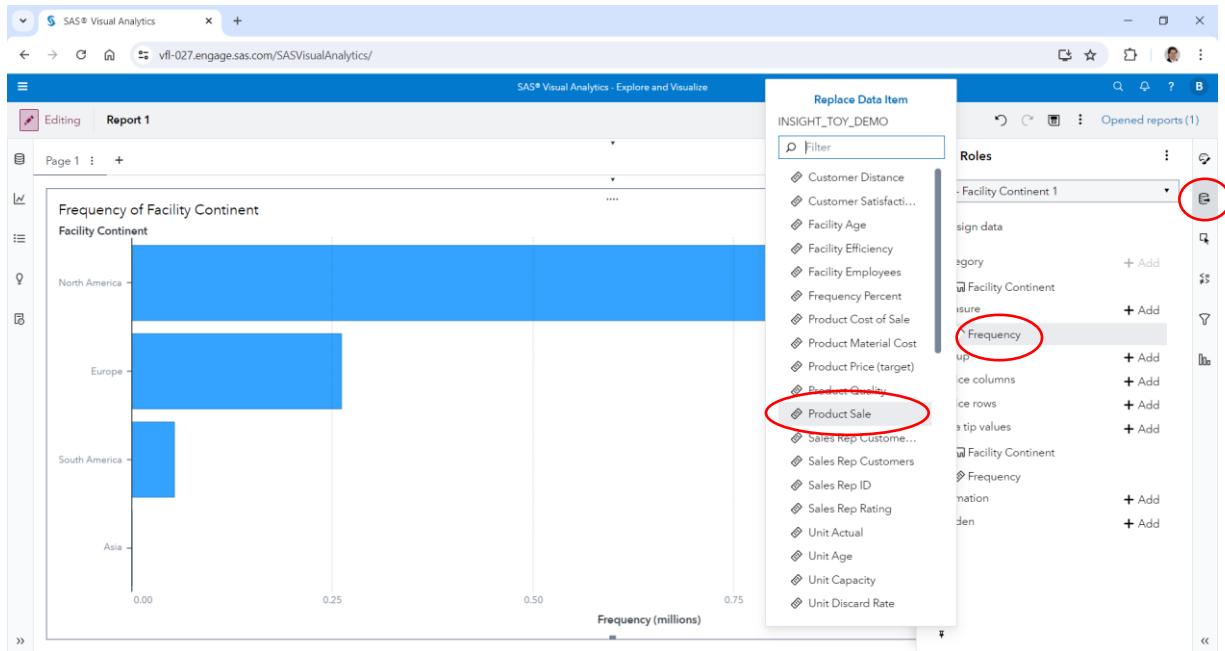
On the right are the parameters of the selected item.

If you don't drop an object, but just a data item, the default most suitable graph will be created.

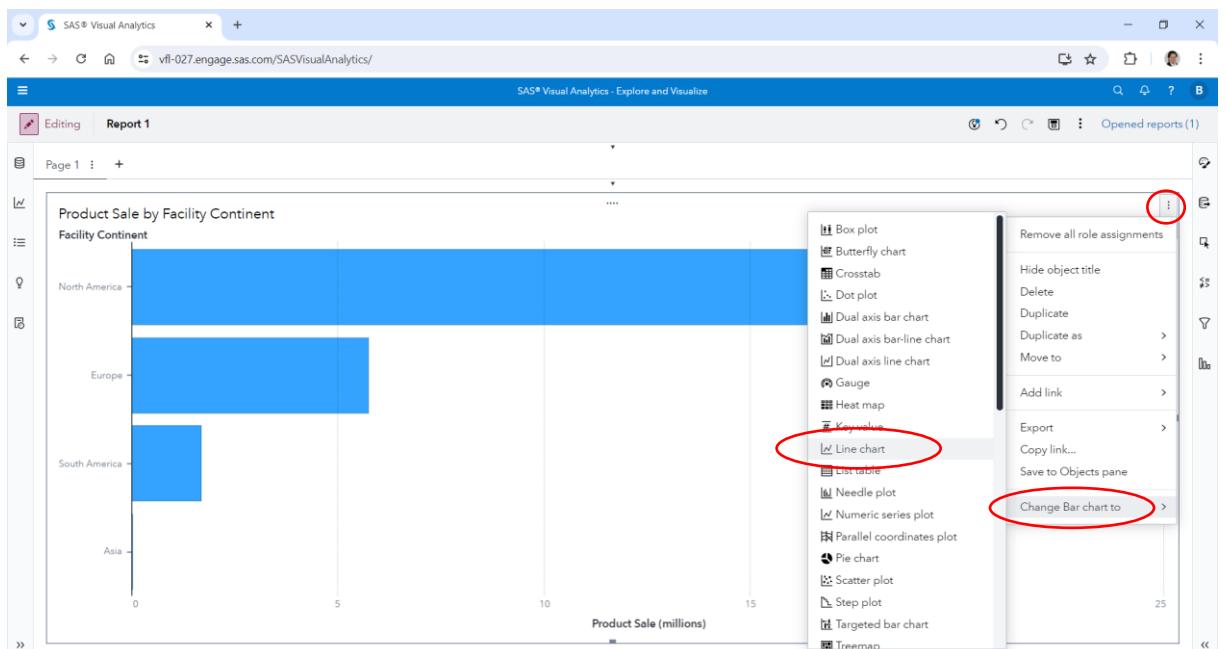
The screenshot is identical to the first one, showing the SAS Visual Analytics reporting interface. A red arrow points from the 'Facility Continent' item in the 'Category' list on the left towards the 'Design a Report' area on the right, indicating where the user should click to generate a visualization.

Double-click on Facility Continent

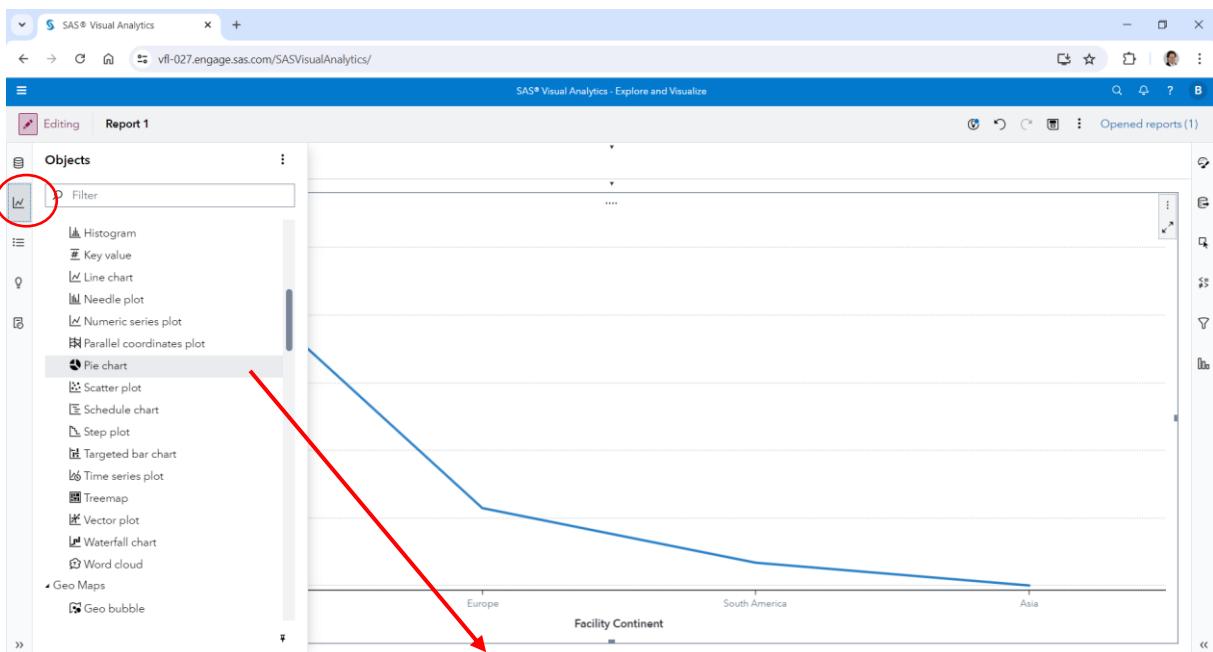
If there is no measurement selected, by default, the frequency will be used. In our case, it is the number of transactions per continent.



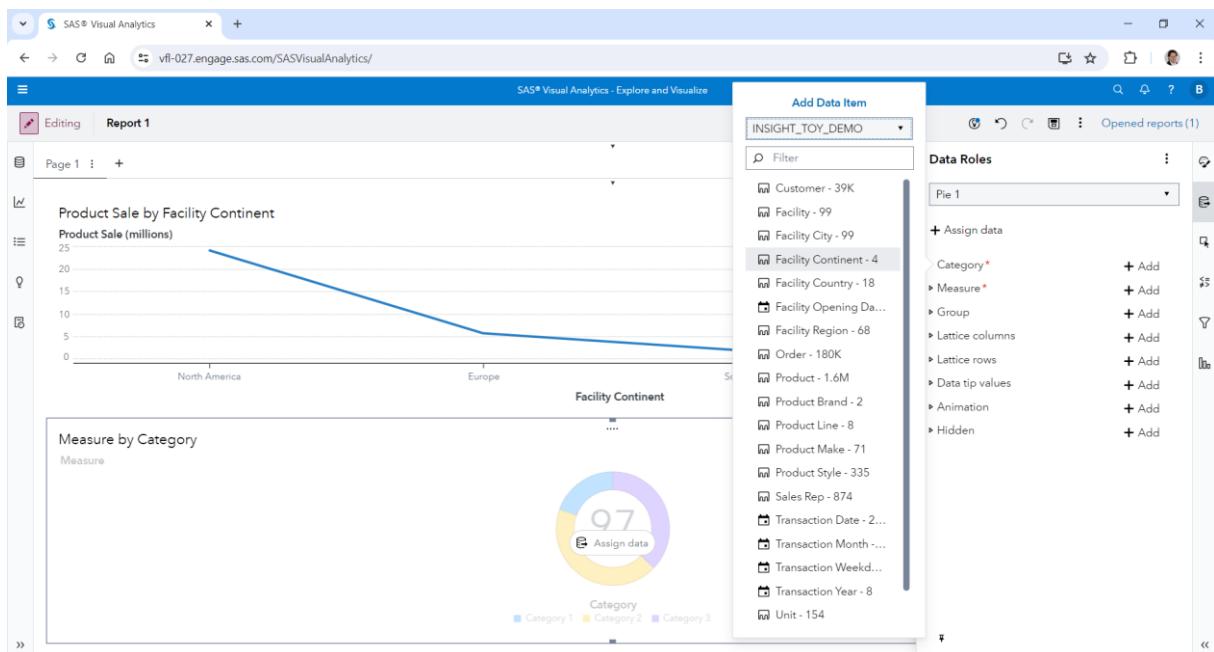
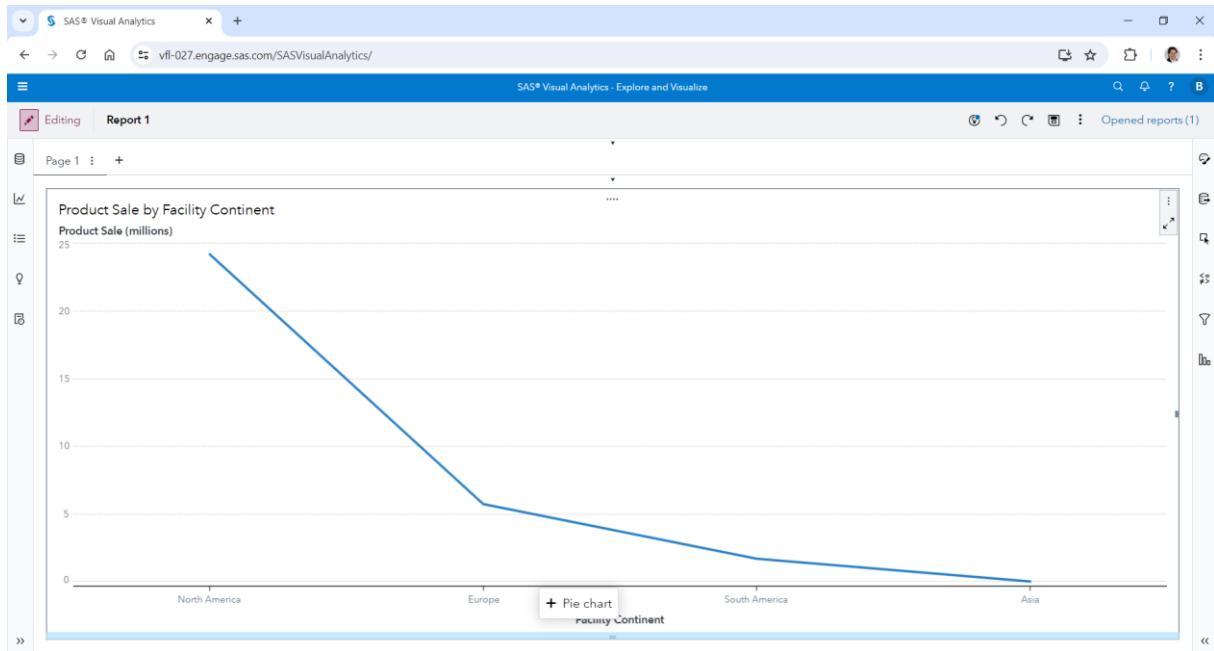
You can replace the frequency by "Product Sale"

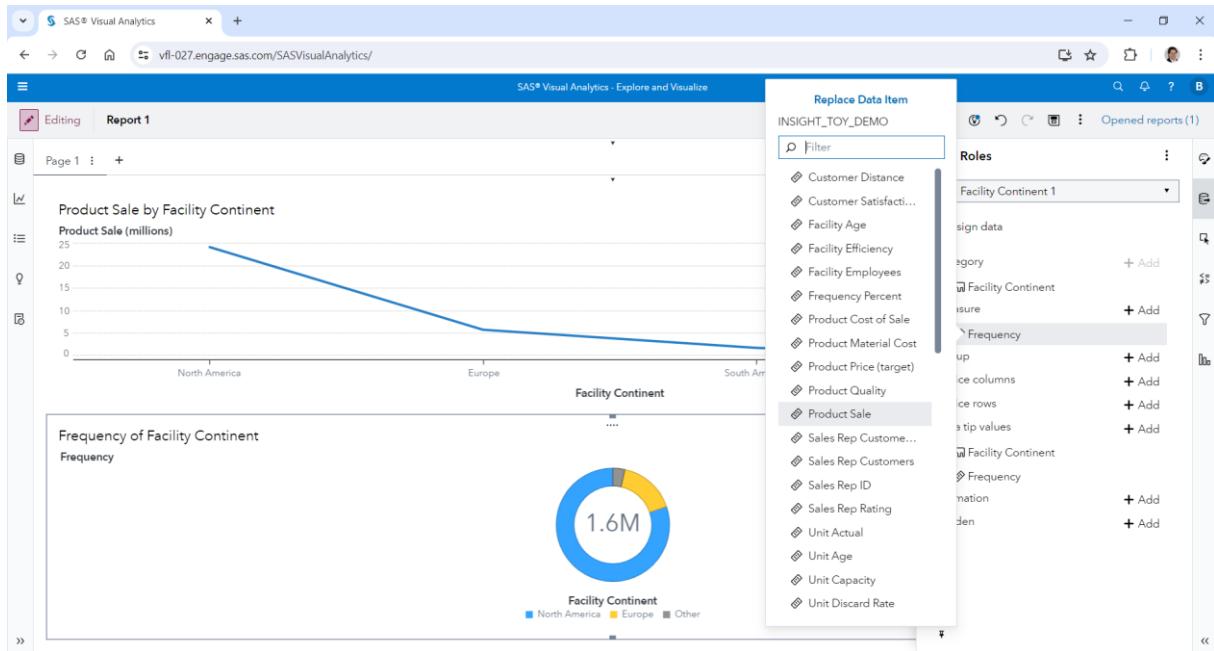


By clicking on the three small dots at the top right of the graph, you can change the representation and select the line chart

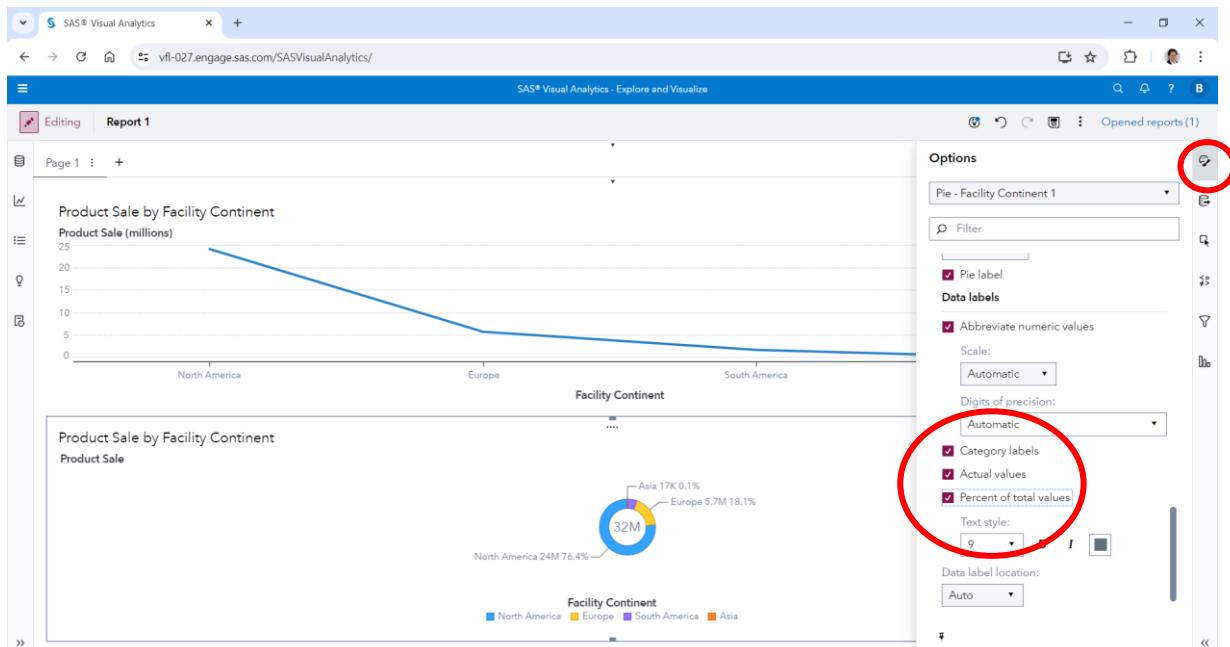


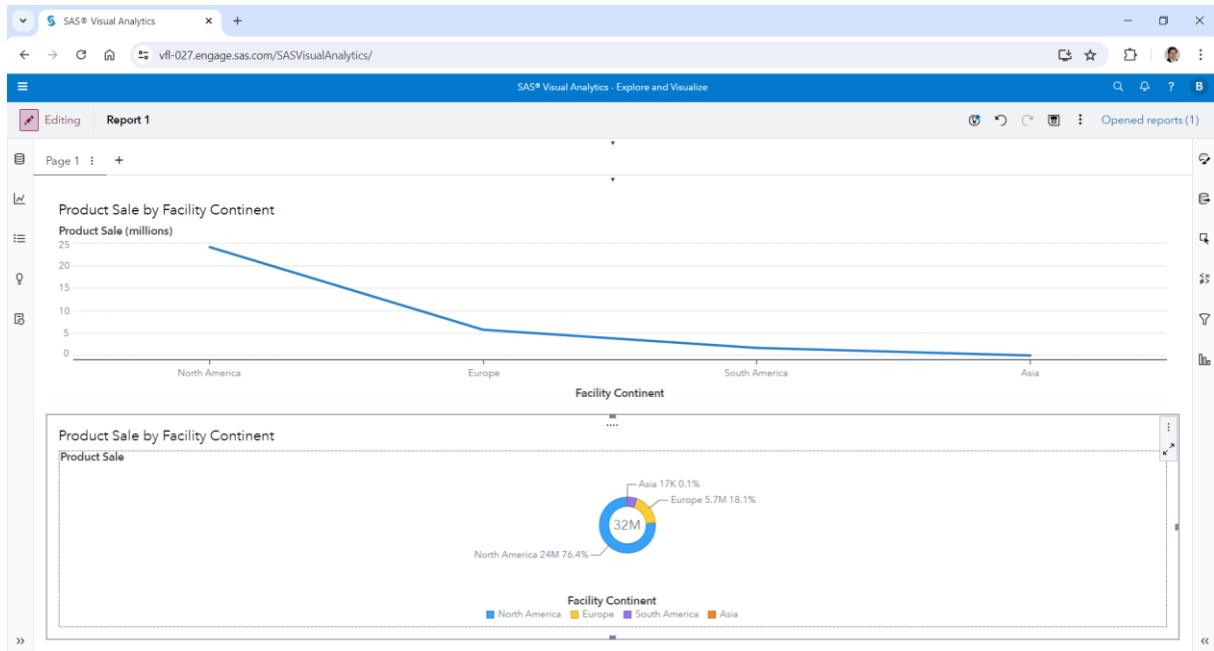
If you want a Pie Chart below the curve, just click the object button, then select this Object and drag and drop it.





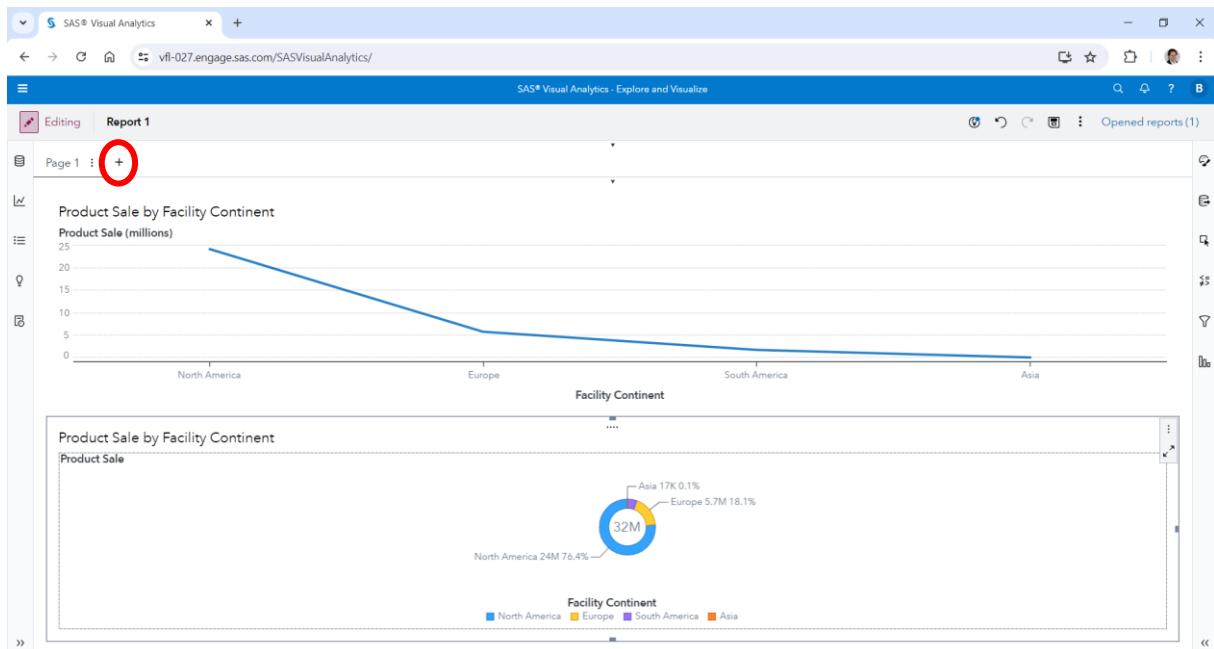
On the right, on the role of data, the "continent" is selected as a category and the frequency is replaced by "Product Sale" as a measure.



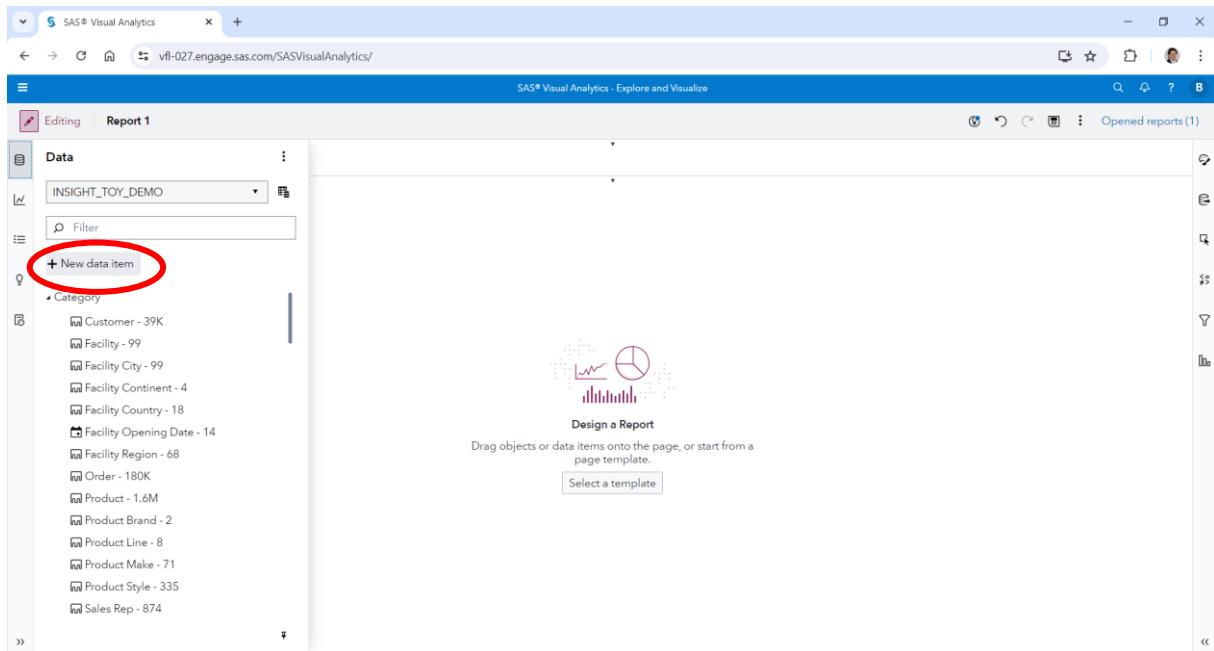


If the resolution is not sufficient, it may be necessary to uncheck the label or enlarge the size of the window.

To add a page to your report, click on **+** next to page 1.



Creating hierarchy and Crosstab



The screenshot shows the SAS Visual Analytics interface. On the left, the 'Data' menu is open, displaying a list of data items under 'Category'. A red circle highlights the '+ New data item' button at the top of the list. The main workspace is titled 'Report 1' and contains a 'Design a Report' section with icons for various data types and a 'Select a template' button.

Go to data menu → select a new data item → hierarchy

You can name it: « HP »

New Hierarchy

Name: * HP

Available items (20):

- Filter
- Facility City - 99
- Facility Continent - 4
- Facility Country - 18
- Facility Opening Date - 14
- Facility Region - 68
- Order - 180K
- Product - 1.6M
- Product Brand - 2
- Product Line - 8
- Product Make - 71
- Product Style - 335
- Sales Rep - 874
- Transaction Date - 2.0K

Selected items (0):

No items have been added.

OK Cancel

New Hierarchy

Name: * HP

Available items (15):

- Filter
- Customer - 39K
- Facility - 99
- Facility City - 99
- Facility Continent - 4
- Facility Country - 18
- Facility Opening Date - 14
- Facility Region - 68
- Order - 180K
- Sales Rep - 874
- Transaction Date - 2.0K
- Transaction Month - 93
- Transaction Weekday - 5
- Transaction Year - 8

Selected items (5):

- Product Brand - 2
- Product Line - 8
- Product Make - 71
- Product Style - 335
- Product - 1.6M

OK Cancel

Select in order:

Product Brand

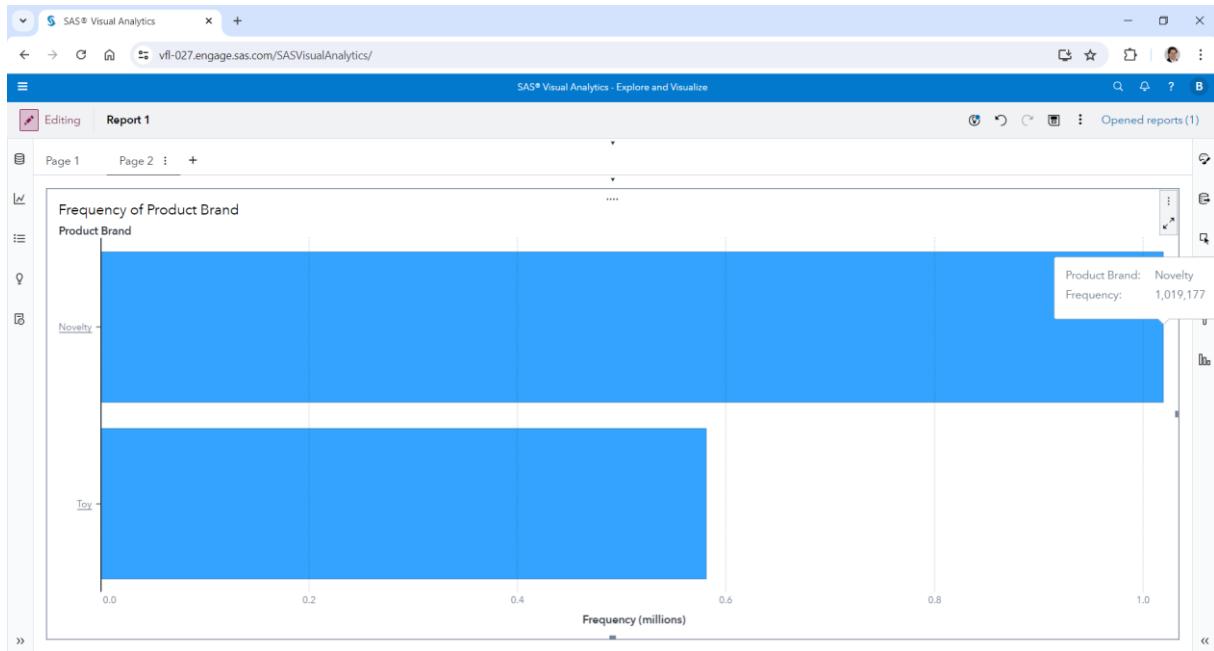
Product Line

Product Make

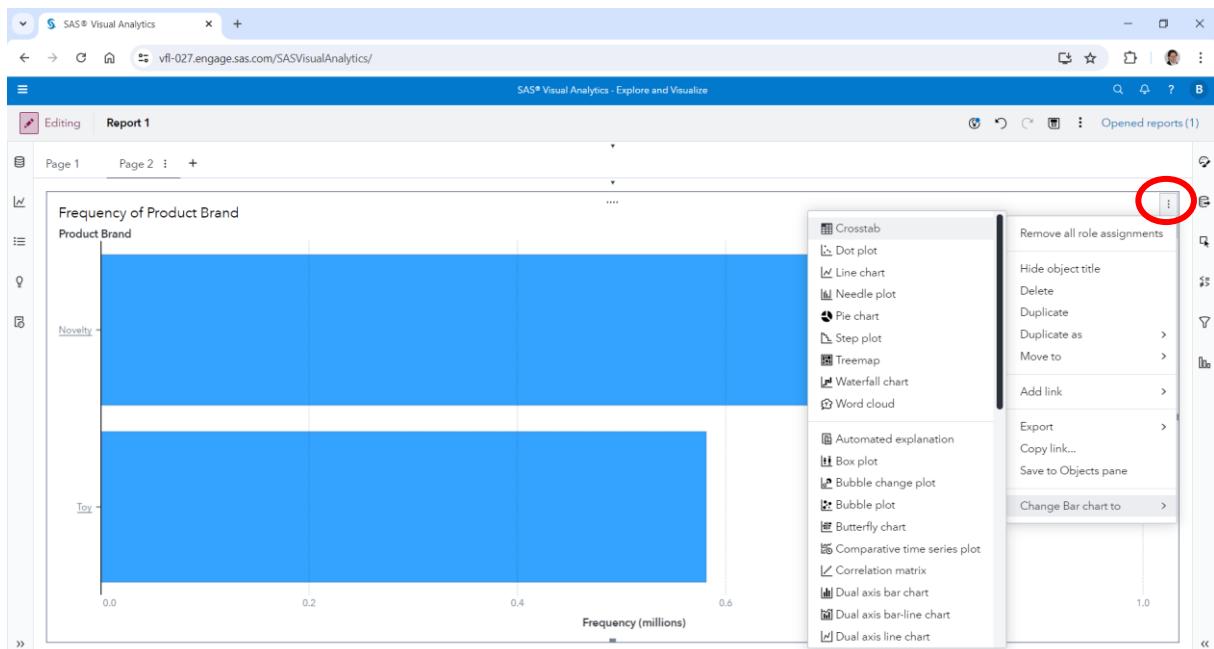
Product Style

Product

OK



By adding the product hierarchy, the default graph is a bar chart.



This representation can be replaced by a crosstab.

We can add "Product Sale" to replace the Frequency.

If you click on the name of the hierarchy level, you select it.

If you click on the arrow after the name, you expand it.

Product Brand	Product Line	Product Make	Product Sale
Novelty	Figurine	Board Game (I)	12421675
		Board Game (II)	6389029
		Board Game (III)	579954
		Card Game	1108619
		Dice	1682813
		Puzzle (I)	225357
		Puzzle (II)	113211
< Toy	< Game	Puzzle 3d	332471
		Plush	671847
			1669873
			6473527

Add a third page to your report.

Create a geographical hierarchy

To represent the data on a world map, we will here create a geographical hierarchy « Continent → Country → Region → City → Facility » using coordinates World Geodetic System (WGS84) coordinates.

In data:

The screenshot shows the SAS Visual Analytics interface. In the left sidebar, under the 'Data' section, there is a list of data items. One item, 'Facility Continent - 4', has a red circle drawn around it. The 'Name:' field for this item contains 'Facility Continent'. Below the name, there is a 'Classification:' dropdown menu with two options: 'Category' and 'Geography'. The 'Category' option is selected. To the right of the Data pane, there is a 'Design a Report' area with a placeholder message: 'Drag objects or data items onto the page, or start from a page template.' A 'Select a template' button is located below this message.

Click on the double arrow to modify the properties of "Facility Continent"

Instead of category, select Geography

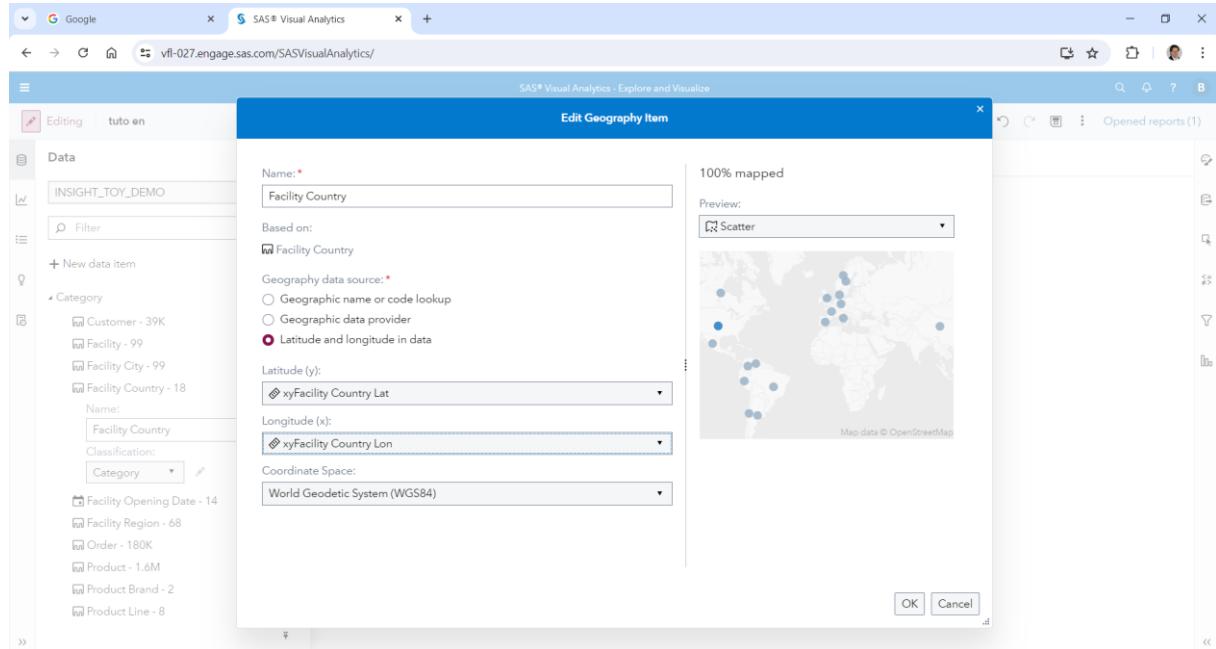
The screenshot shows the SAS Visual Analytics interface with a modal dialog box titled 'Edit Geography Item'. This dialog is used to modify the properties of the 'Facility Continent' item. Inside the dialog, there are several settings: 'Name:' set to 'Facility Continent', 'Based on:' set to 'Facility Continent', 'Geography data source:' with 'Latitude and longitude in data' selected (this option is circled in red), 'Latitude (y):' set to 'xFacility Continent Lat', 'Longitude (x):' set to 'xFacility Continent Lon', and 'Coordinate Space:' set to 'World Geodetic System (WGS84)'. On the right side of the dialog, there is a preview section showing a world map with three blue dots representing data points. Below the map, it says '100% mapped'. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Select Latitude and longitude in data

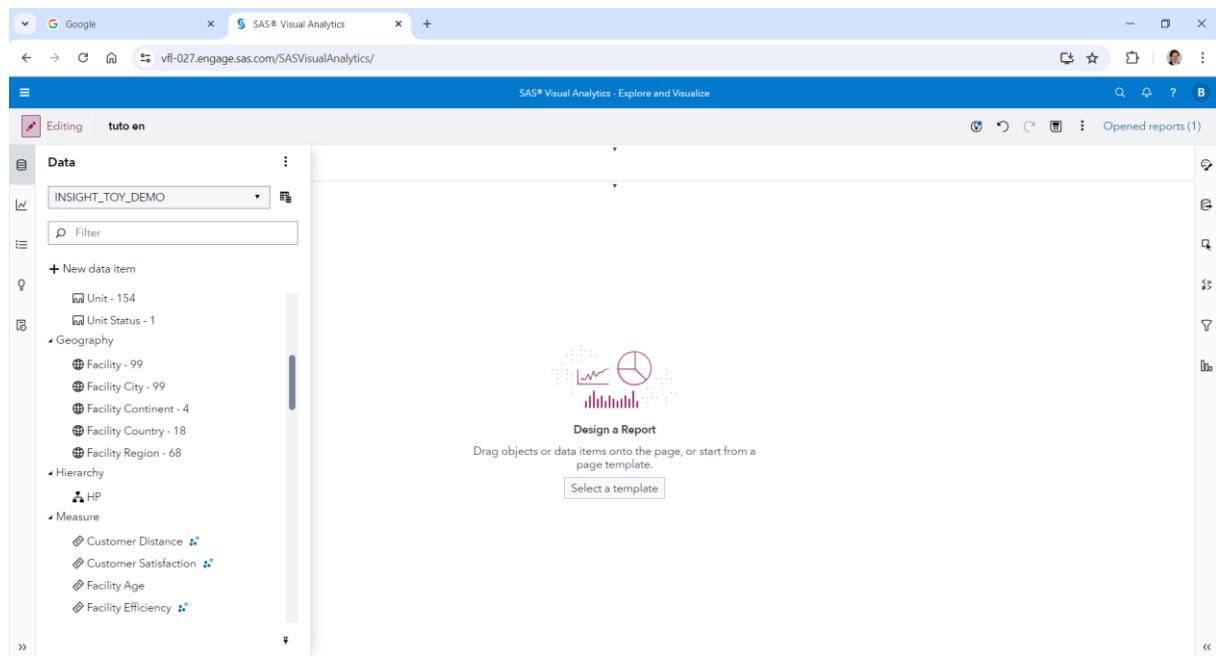
Select "xyFacility Continent Lat" for Latitude
And select "xyFacility Continent Lon" for Longitude

OK

Repeat the same steps to Country, Region, City and Facility



The screenshot shows the 'Edit Geography Item' dialog box in SAS Visual Analytics. The 'Name:' field contains 'Facility Country'. The 'Based on:' field also contains 'Facility Country'. Under 'Geography data source:', the option 'Latitude and longitude in data' is selected. The 'Latitude (y):' field is set to 'xyFacility Country Lat' and the 'Longitude (x):' field is set to 'xyFacility Country Lon'. The 'Coordinate Space:' field is set to 'World Geodetic System (WGS84)'. A preview map shows several blue dots representing data points across the world map. At the bottom right of the dialog are 'OK' and 'Cancel' buttons.



The screenshot shows the main workspace of SAS Visual Analytics. On the left, the data browser displays a tree structure of data items. Under the 'Data' category, 'INSIGHT_TOY_DEMO' is selected. Under 'Geography', 'Facility' is listed. Other categories like 'Hierarchy' and 'Measure' are also visible. In the center, there is a 'Design a Report' area with a large circular icon and a 'Select a template' button. The top navigation bar includes the URL 'vfl-027.engage.sas.com/SASVisualAnalytics/' and various browser controls.

We get five geographical elements.
A hierarchy can then be created: New data item → to add a new hierarchy.

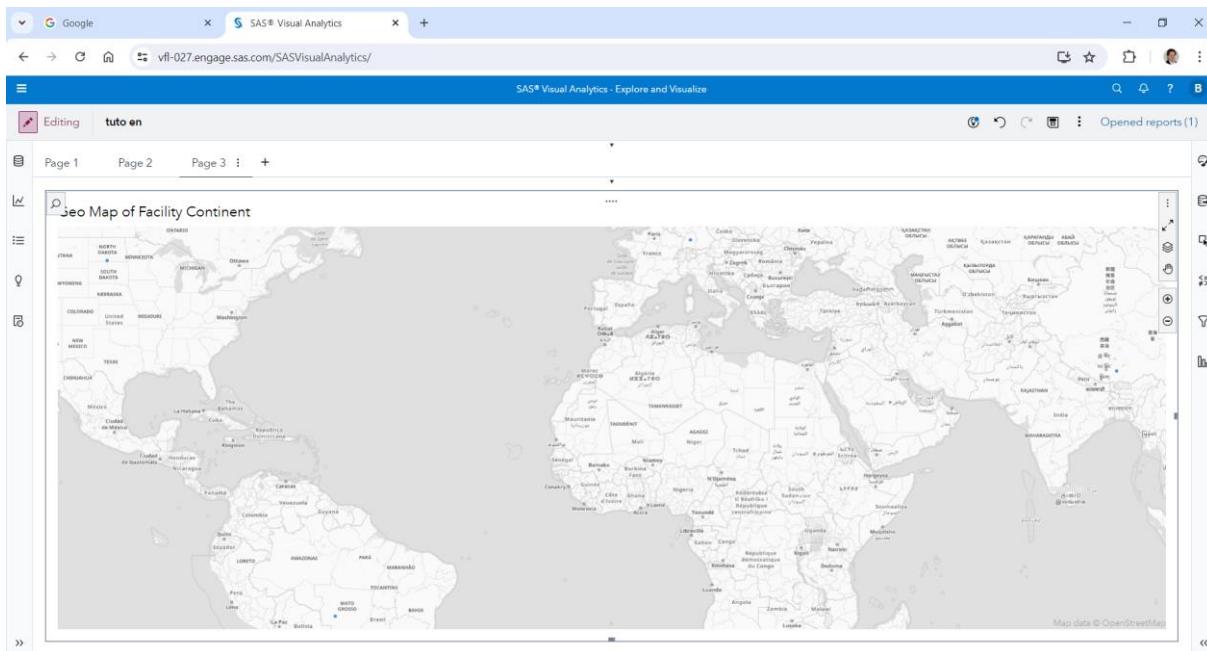
The screenshot shows the SAS Visual Analytics interface. On the left, the Data pane is open, displaying the dataset 'INSIGHT_TOY_DEMO'. It includes sections for Hierarchy, Measure, and Geography. A 'Hierarchy' section is expanded, showing items like 'Custom category', 'Calculated item', 'Geography item', 'Parameter', 'Interaction effect', 'Spline effect', and 'Partition'. Below these are 'Measure' items such as 'Customer Distance', 'Customer Satisfaction', 'Facility Age', and 'Facility Efficiency'. In the center, there is a workspace with a placeholder message 'Design a Report' and a 'Select a template' button.

This screenshot shows the 'New Hierarchy' dialog box. The 'Name:' field is filled with 'Geo'. The 'Available items (15):' list includes various data items: 'Filter', 'Customer - 39K', 'Facility Opening Date - 14', 'Order - 180M', 'Product - 1.6M', 'Product Brand - 2', 'Product Line - 8', 'Product Make - 71', 'Product Style - 335', 'Sales Rep - 874', 'Transaction Date - 2.0K', 'Transaction Month - 93', 'Transaction Weekday - 5', and 'Transaction Year - 8'. The 'Selected items (5):' list contains 'Facility Continent - 4', 'Facility Country - 18', 'Facility Region - 68', 'Facility City - 99', and 'Facility - 99'. At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

Select items in the right order: Continent, Country, Region, City and Facility.

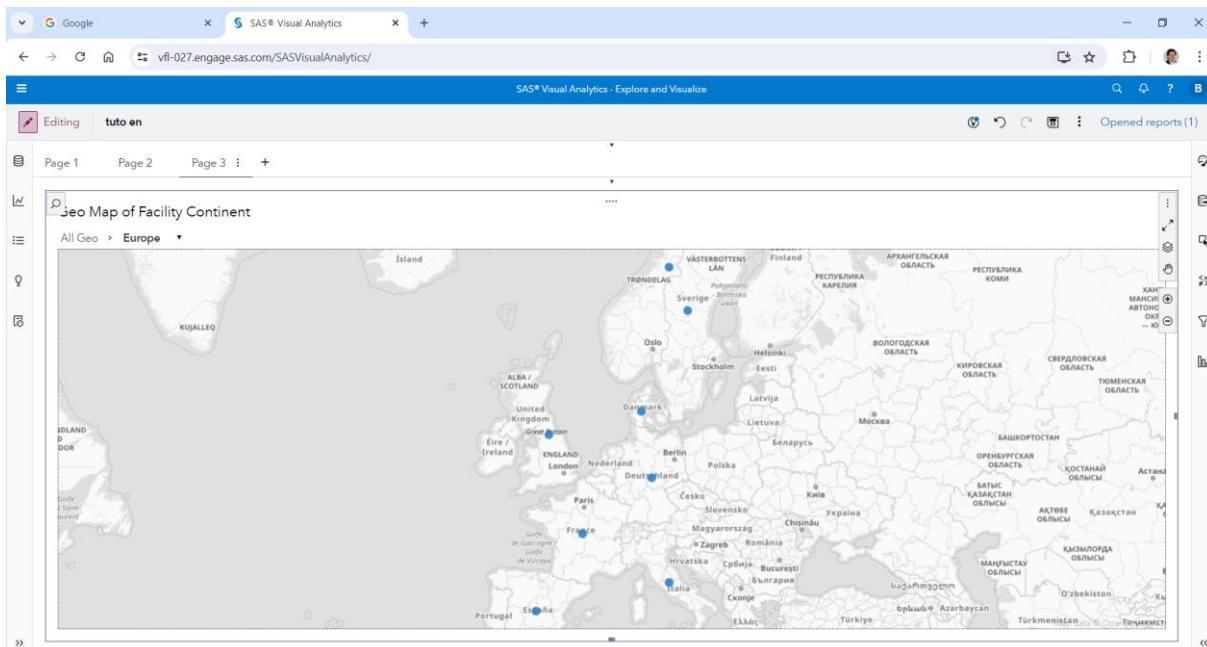
Rename this hierarchy Geo.

OK

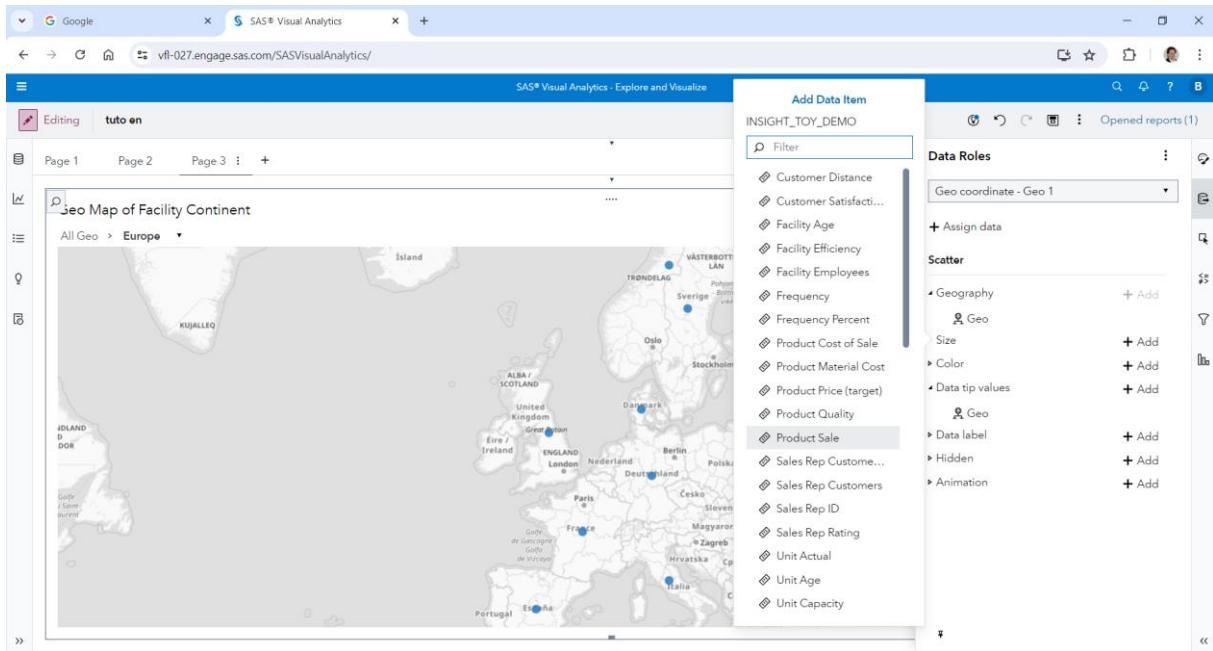


Add this hierarchy to the third page of your Report.

By double-clicking on the point of Europe, we get:



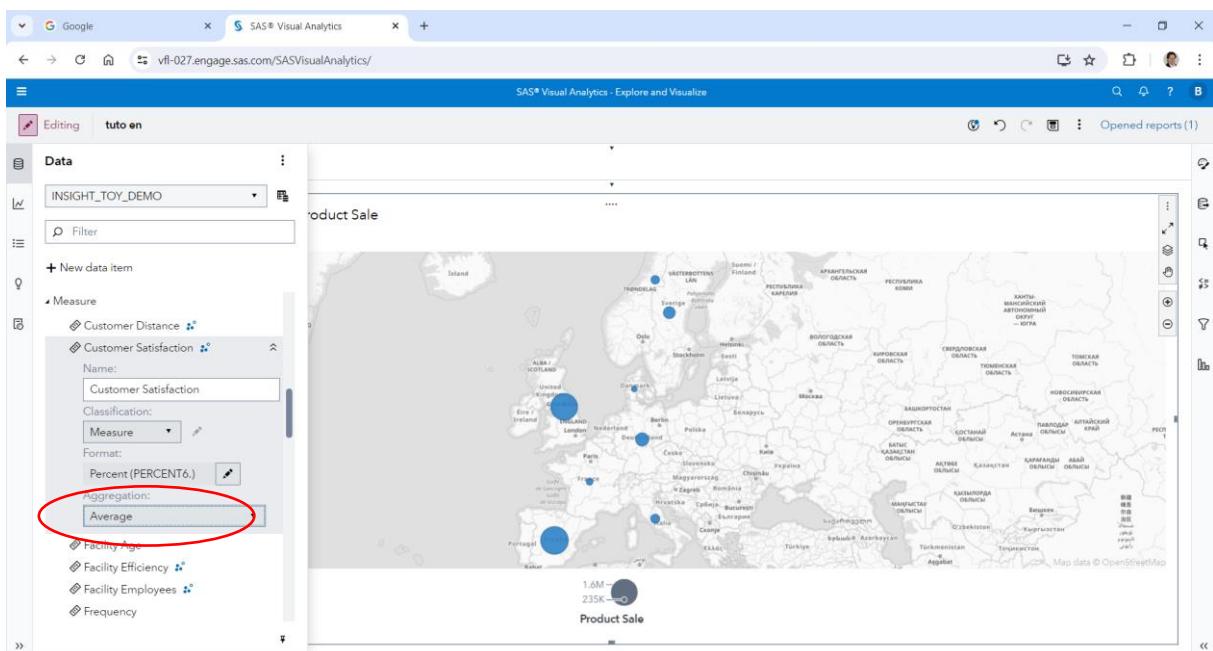
Sizes of dots are frequency. If you want the turnover, you must change it by "Product sale" to the size.



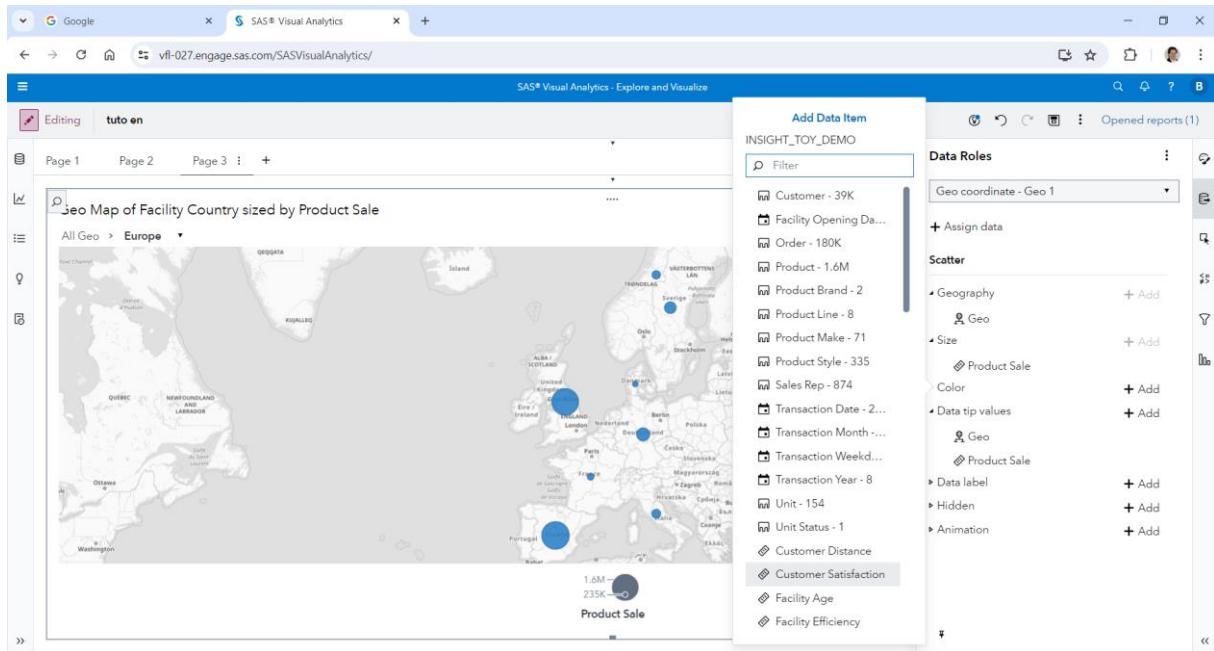
At the top left of the graph, you can go up in hierarchy.

If you also add customer satisfaction, you get the following graph with the color depending on customer satisfaction.

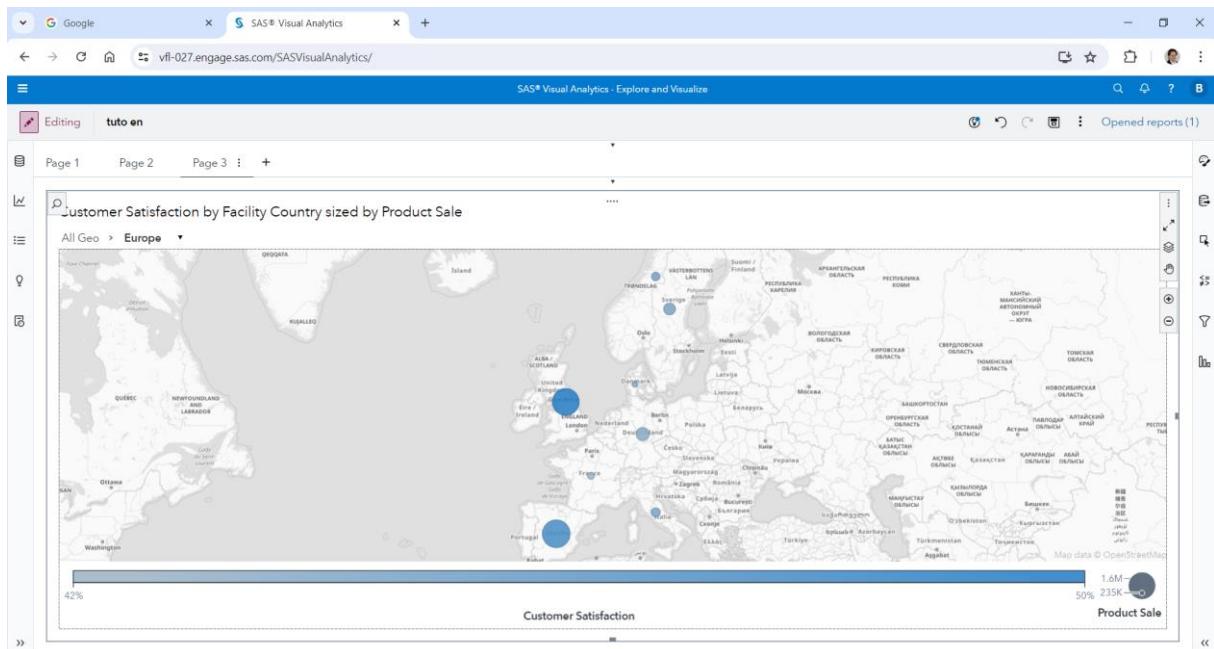
Customer satisfaction is a percentage. The sum of a percentage does not make sense but the average yes.



For customer satisfaction, select aggregation by average.

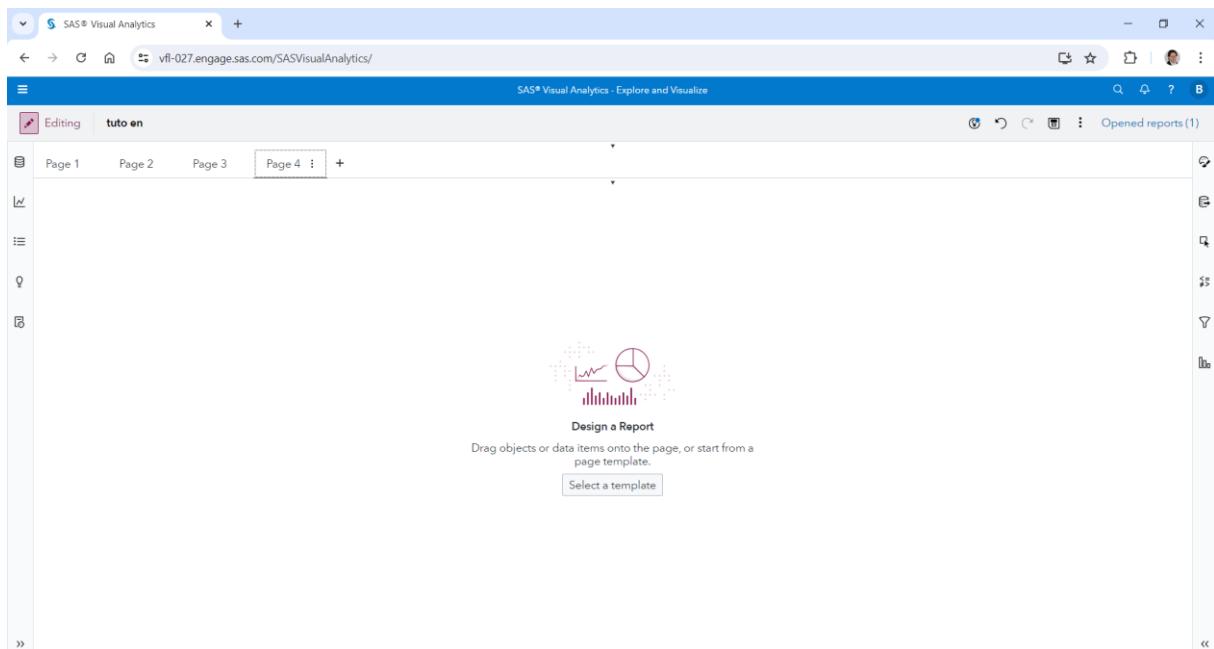


Add customer satisfaction as color points on your card.



Add a fourth page to your report.

Create dashboards

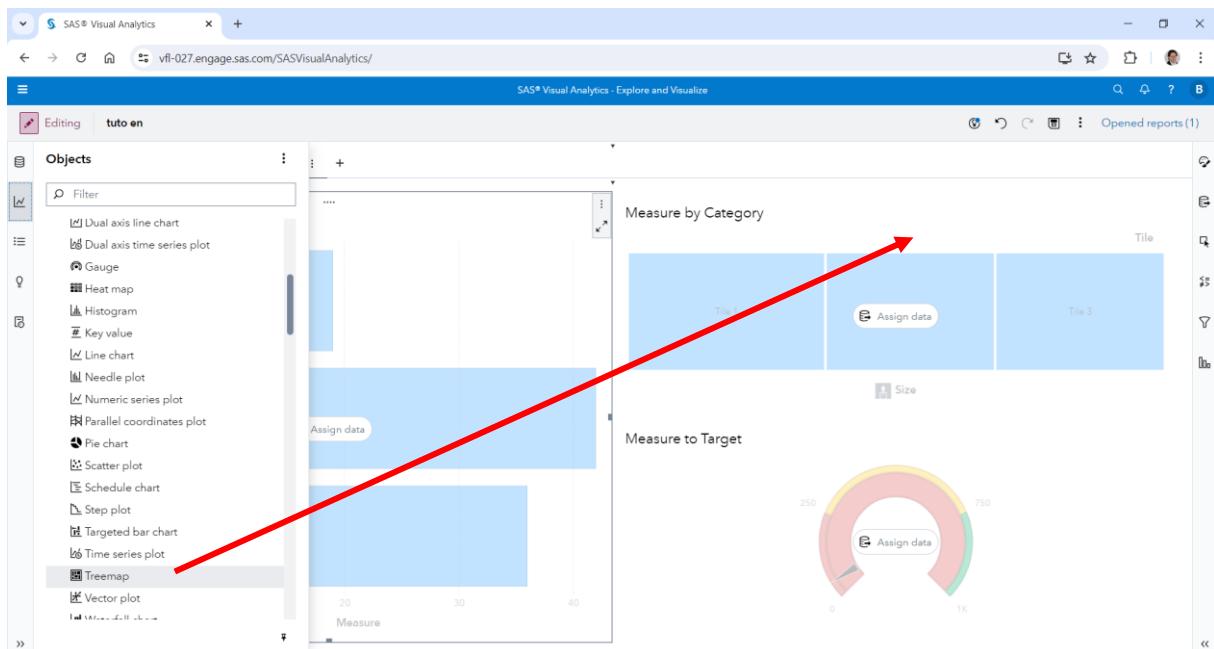


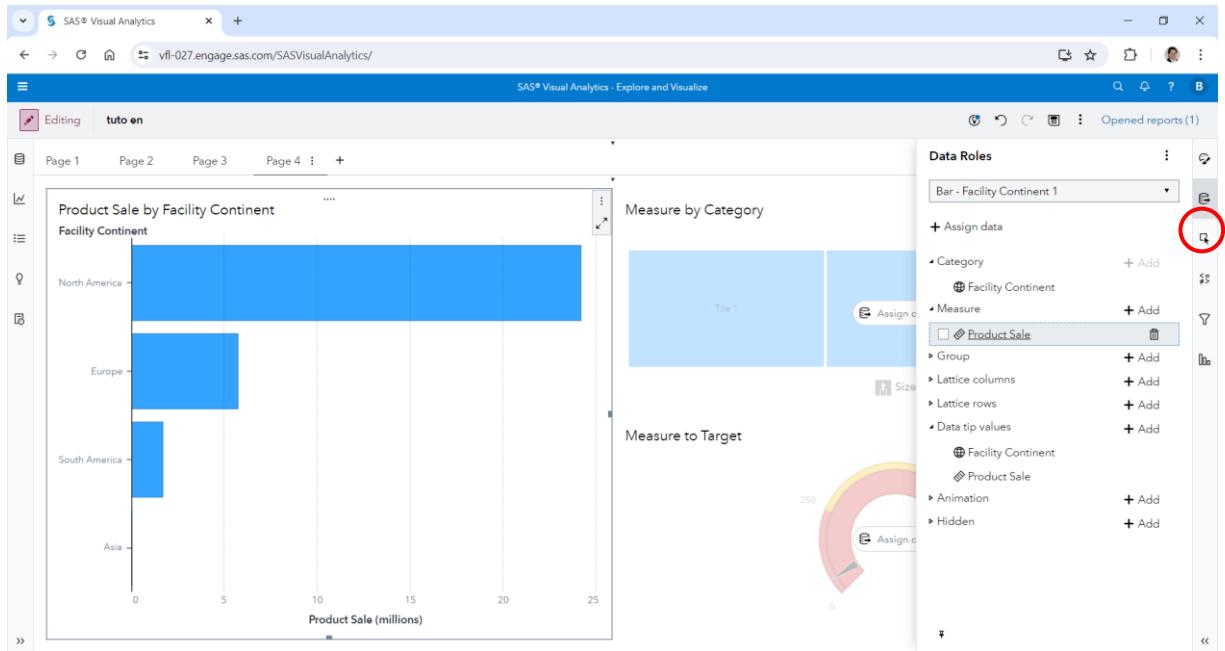
In your 4th page, from objects, select and drop then

The Bar Chart in the middle,

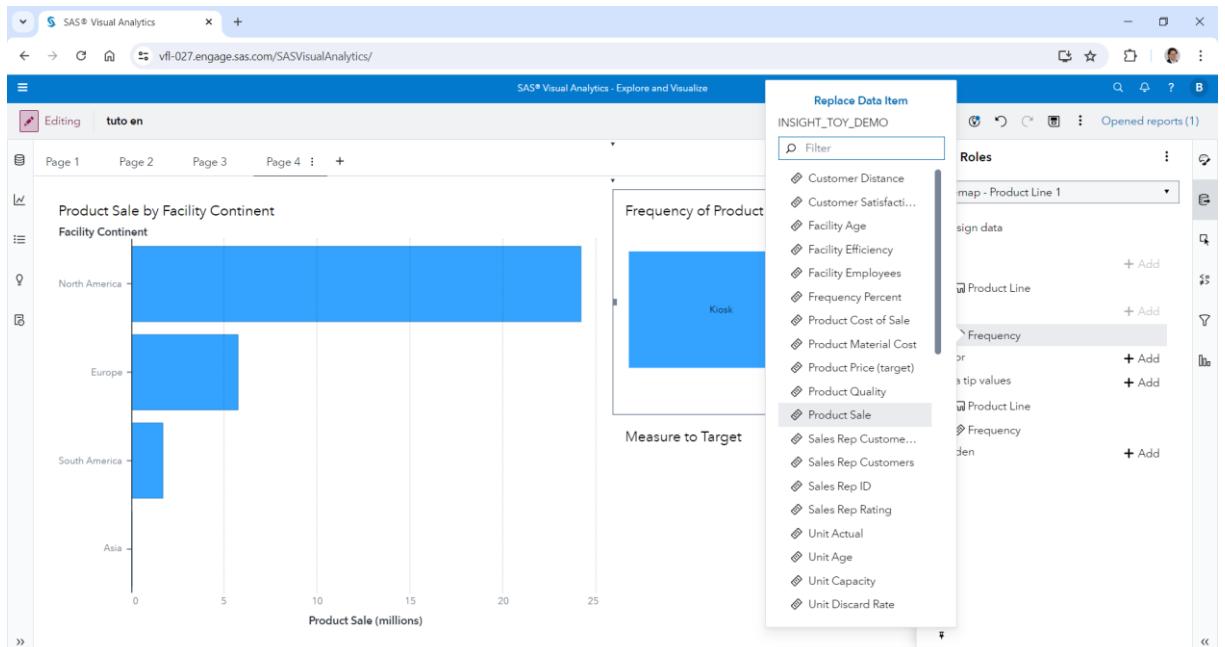
The Tree Map on the right,

And the Gauge at the bottom right.

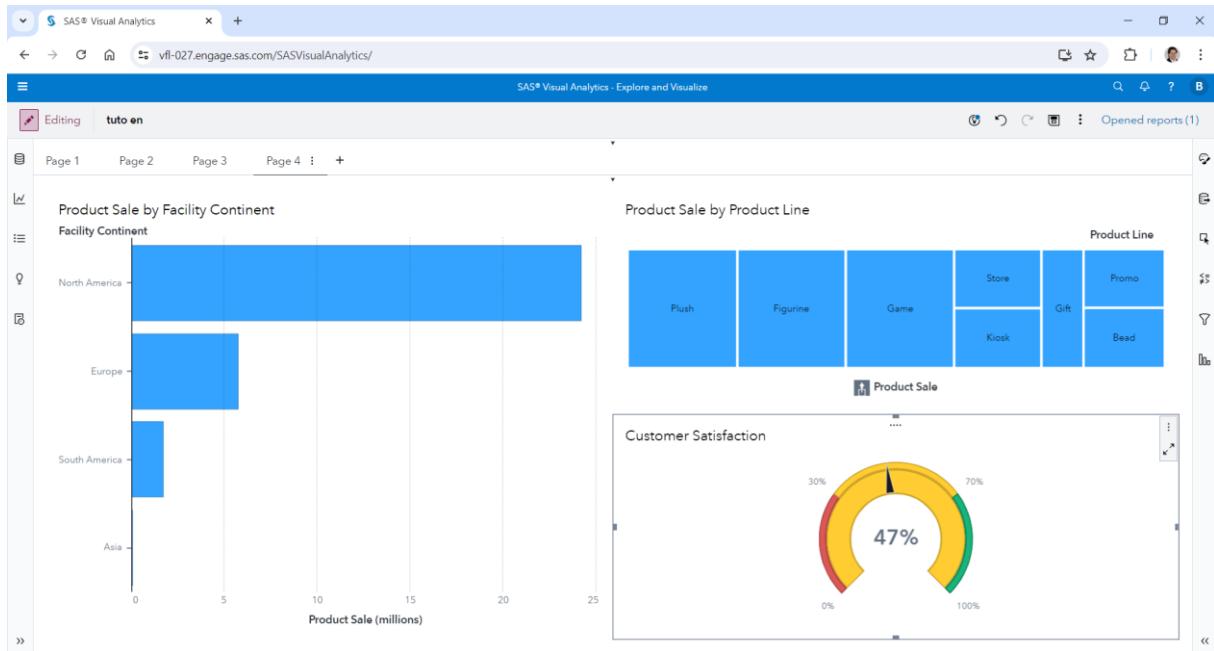




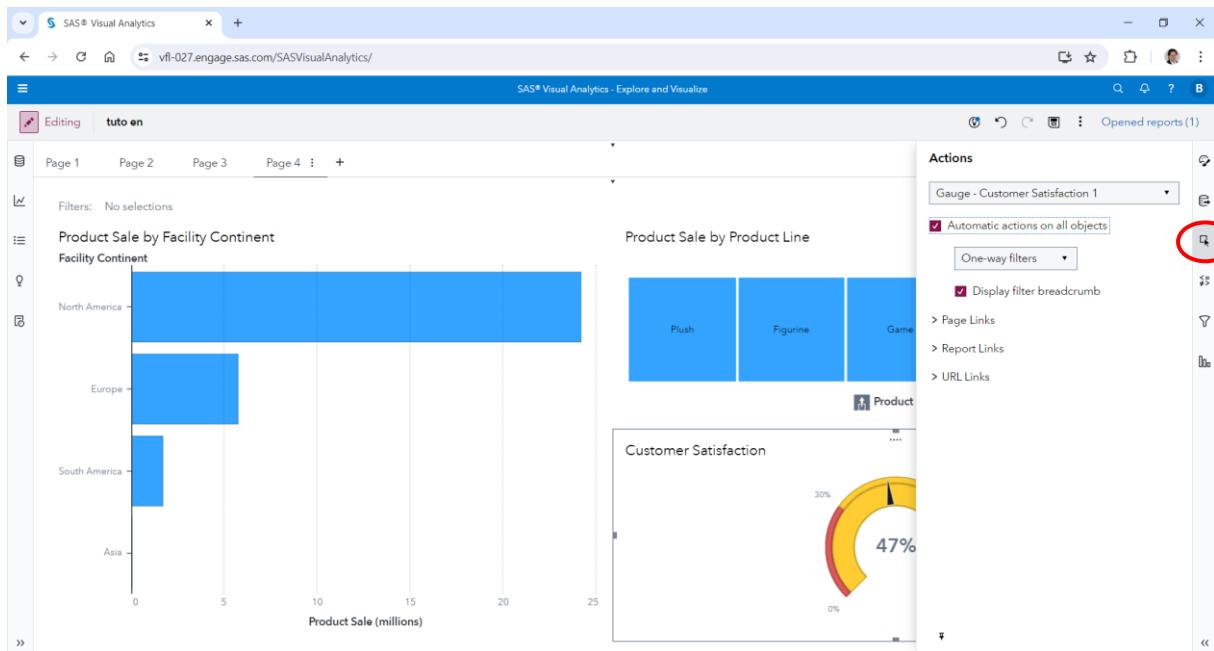
When the Bar Chart is selected, select Facility Continent as a Category and replace the Frequency by Product sale



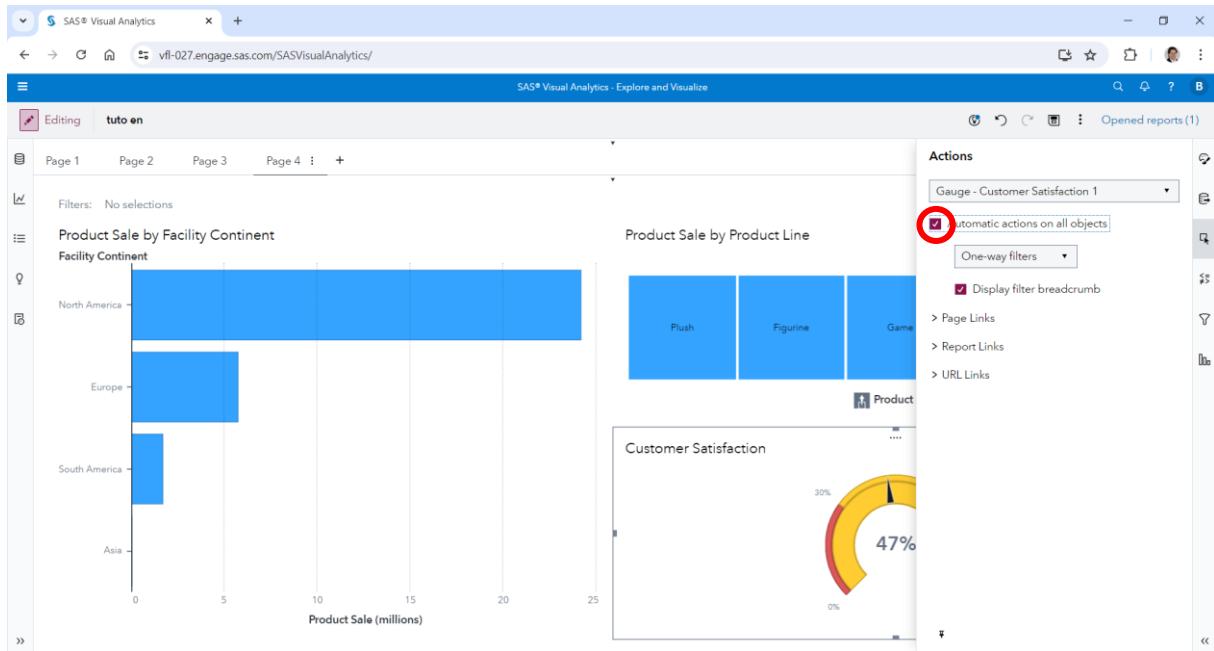
When the Tree Map is selected, select Product Line as a Category and replace the Frequency by Product sale



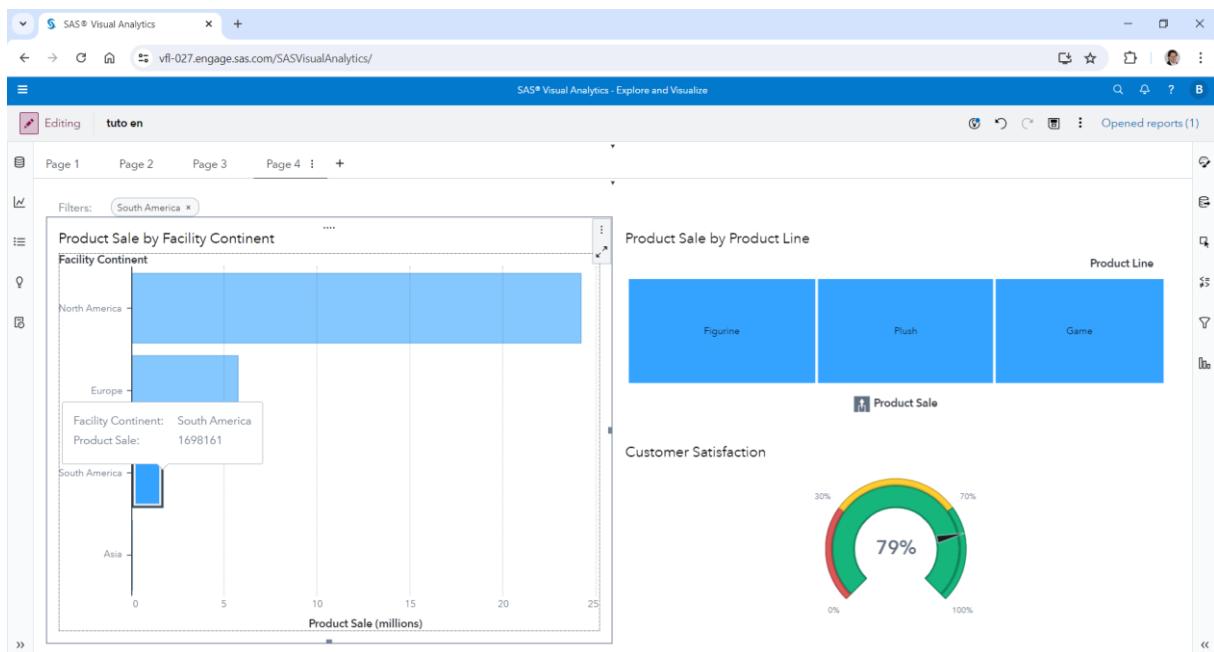
When the Gauge is selected, select Customer Satisfaction as a Measure



When the Bar Chart is selected, in the right, in Actions, select Automatic actions on all objects

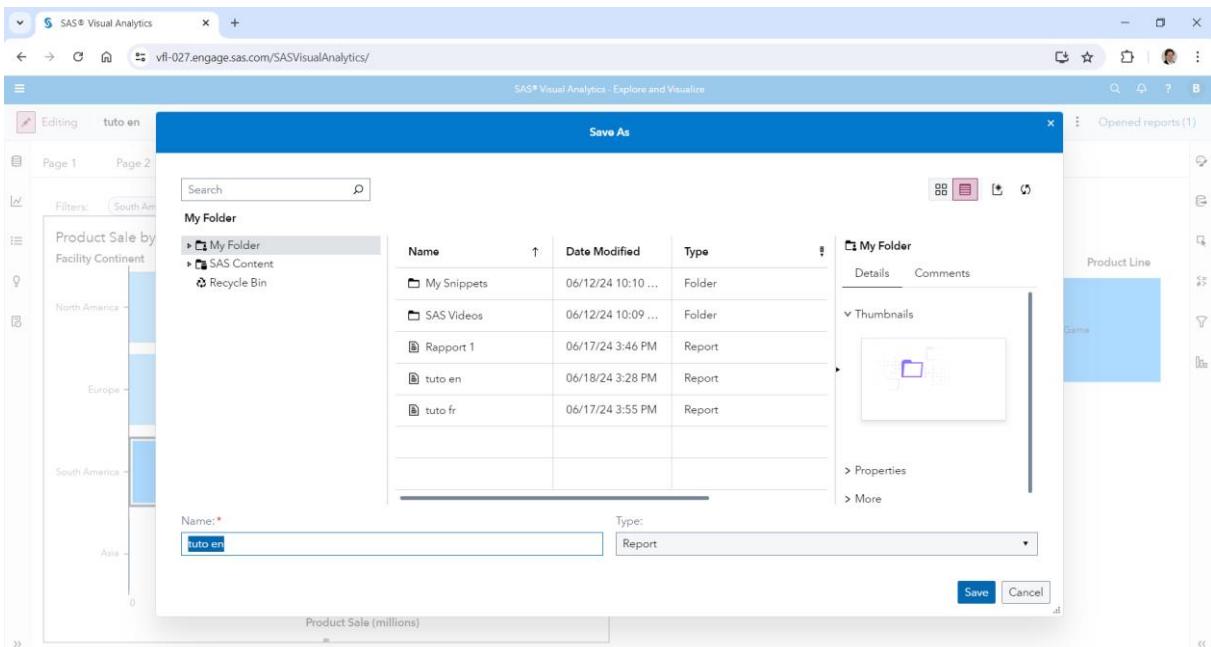
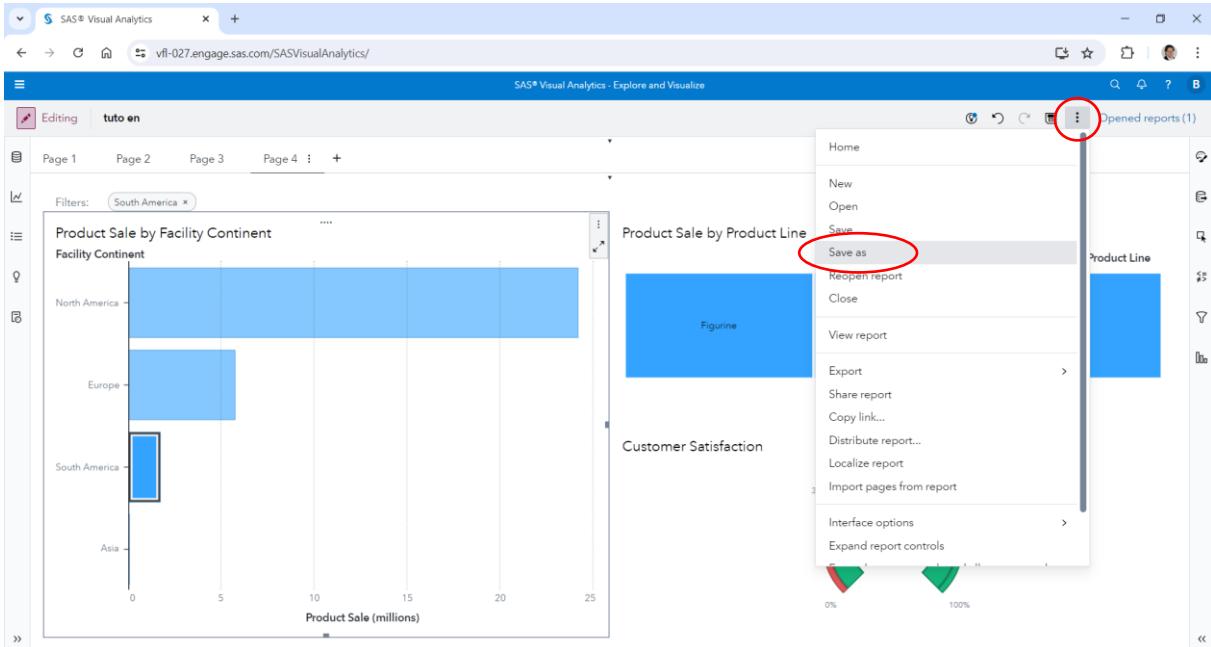


If you click on a stick in Bar Chart, it filters elements in other two objects.



For example, in South America, customer satisfaction is excellent.

Save your work



You can save it in your folder

Save

Export in pdf your work in pdf

The screenshot shows the SAS Visual Analytics interface. On the left, there is a bar chart titled "Product Sale by Facility Continent" with filters for "South America". On the right, there are two cards: "Product Sale by Product Line" (Figure) and "Customer Satisfaction". A context menu is open at the top right, with the "Export" option highlighted and circled in red. The "PDF" option under "Export" is also circled in red.

Export → PDF

The screenshot shows the SAS Visual Analytics interface with the "Export as PDF" dialog box open. The dialog has two tabs: "Document Setup" (selected) and "Select Objects". Under "PAGE SETUP", the paper size is set to "Letter" and the orientation is "Landscape". Under "OPTIONS", several checkboxes are checked: "Show page numbers", "Include appendix information", and "Include cover page". At the bottom right of the dialog, the "Export" button is circled in red.

Export

Save your pdf in your computer.

Go back to SAS Visual Analytics

Create a new report

The screenshot shows the SAS Visual Analytics interface. On the left, there is a navigation bar with tabs for 'Editing' and 'tuto en'. Below it, a page navigation bar shows 'Page 1', 'Page 2', 'Page 3', 'Page 4', and a '+' button. A filter bar indicates 'Filters: South America'. The main content area contains three visualizations: a horizontal bar chart titled 'Product Sale by Facility Continent' showing sales for North America (~24 million), Europe (~6 million), South America (~1 million), and Asia (~0.5 million); a blue square visualization titled 'Product Sale by Product Line' labeled 'Figurine'; and a blue square visualization titled 'Customer Satisfaction'. A context menu is open on the right side of the screen, listing options such as 'New', 'Open', 'Save', 'Save as', 'Reopen report', 'Close', 'View report', 'Export', 'Share report', 'Copy link...', 'Distribute report...', 'Localize report', 'Import pages from report', 'Interface options', and 'Expand report controls'. The menu has a dark grey background with white text and some icons.

Exercises

Create a new report on Insight toy Demo (same data base)

- 1) Create an automatic chart that shows the Product Cost of Sale by Facility Continent.
- 2) Create in a new page, a box plot that shows the Product Cost of Sale by Product Line.
- 3) Create in a new page, an automatic chart that shows the Unit Capacity by Transaction Month.
- 4) Create a tree map visualization that shows Product Sale by Facility Country.
- 5) What is the product sale for each country in South America? Use at least three types of charts and suggest which one in your opinion works better in answering this question. After you created the first chart, duplicate your chart by clicking on Duplicate.
- 6) In which two months of 2004 the cost of sale was lowest in Atlanta? Use just one chart to answer the question.
- 7) Create a report with at least four sections (=pages).

The BI report should include key facts about company's performance on a global and regional level. These facts should include both financial and marketing related data.

Try to decide the appropriate visualization tool depending on the data you use. How will the charts be perceived by a simple user? What questions he/she may ask?

Make use of additional tools such as global and local filters and text inputs.

Use at least six different charts from both Graphs and Tables objects, two from Gauges, two from Controls and two from Others.

Print your report: it will create a pdf. Save the pdf and send it by mail to our professor.

Machine Learning with Visual Analytics Hands-On

Big Organics

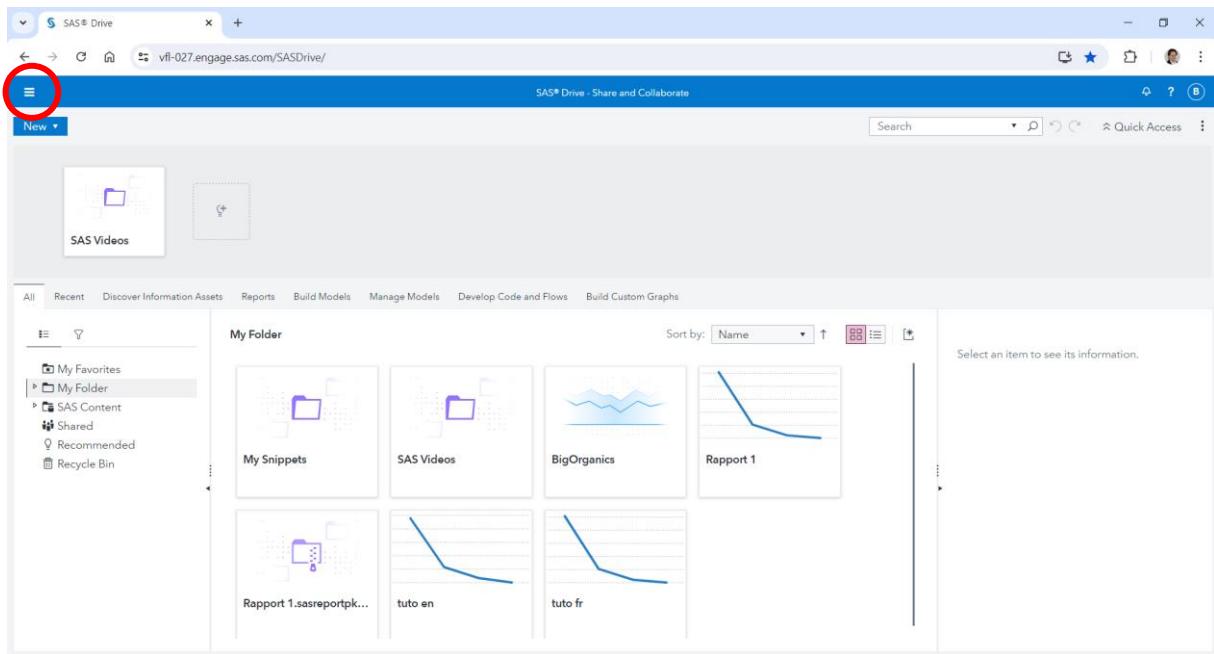
Description:

A supermarket has a customer loyalty program and is offering a new line of organic products. As an initial buyer incentive plan, the supermarket provided coupons for the organic products to all of the loyalty program participants and collected data that include whether these customers have purchased any of the organic products. The supermarket's management wants to determine which customers are likely to purchase these organic products.

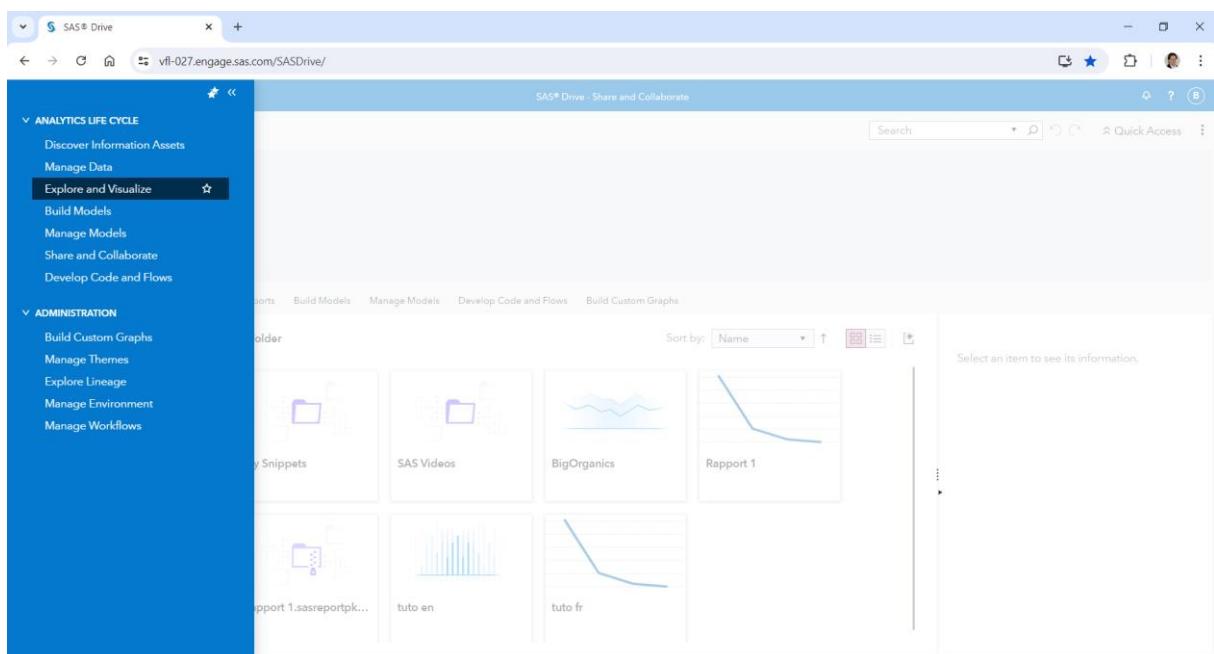
Data

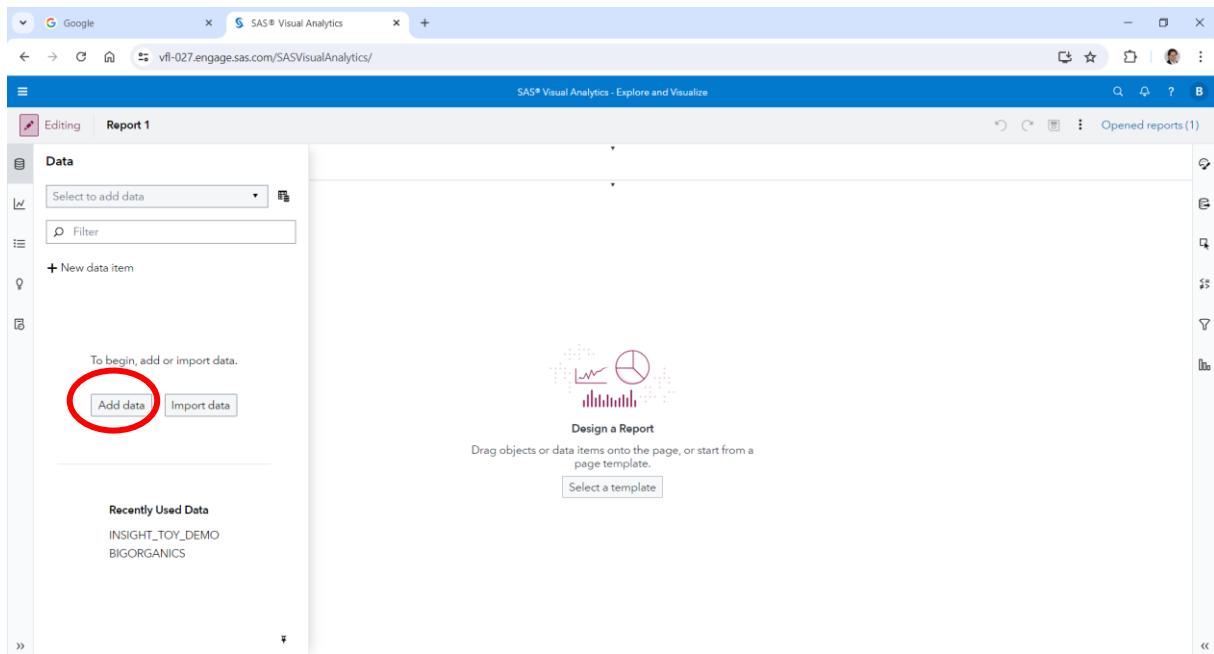
The Organics data set contains 13 variables and 111 115 observations.

Name	Type	Class	Description
Affluence Grade	Numeric	Measure	Affluence Grade is a grade measured on a scale from 1 to 34
Age	Numeric	Measure	Age is the age in years
Customer Loyalty ID	Character	Category	Customer Loyalty Identification number
Gender	Character	Category	Customer gender (M = male, F = female, U = unknown)
Geographic Region	Character	Category	Geographic Region (5 regions in UK: South East, South West, Midlands, North, Scottish)
Loyalty Card Tenure	Numeric	Measure	Loyalty Card Tenure is the time as a loyalty card member (in months: 0-39)
Loyalty Status	Character	Category	Status of the loyalty card (Tin, Silver, Gold, Platinum)
Organics Purchase Count	Numeric	Measure	TARGET (discrete) - Number of Organic Products Purchased
Organics Purchase Indicator	Numeric	Measure	TARGET (binary) - Organic Products Purchased? (1 = yes, 0 = no)
Television Region	Character	Category	Regional TV broadcasting
Total Spend	Numeric	Measure	Total amount spent (previously)



Once in the SAS Viya for Learners - Drive, on the three small lines at the top left, select "Explore and Visualize Data"





Add data

This screenshot shows the 'Choose Data' dialog box from the SAS Visual Analytics interface. It displays a search result for 'bigor' with one item found. The item 'BIGORGANICS' is highlighted with a red circle. To the right of the list, there's a preview pane showing 'BIGORGANICS' is part of 'TUNDATA' and has 13 columns. At the bottom right of the dialog, there's another red circle around the 'Add' button.

Open Organics data

The screenshot shows the SAS Visual Analytics interface. The left pane, titled 'Data', contains a dropdown menu set to 'BIGORGANICS' and a 'Filter' search bar. Below these are sections for 'New data item', 'Category' (listing items like Customer Loyalty ID - 111K, Gender - 4, etc.), and 'Measure' (listing items like Affluence Grade, Age, Frequency, etc.). The right pane, titled 'SAS® Visual Analytics - Explore and Visualize', features a 'Design a Report' section with a placeholder message 'Drag objects or data items onto the page, or start from a page template.' and a 'Select a template' button. Red arrows point from the text descriptions below to the corresponding sections in the interface.

The left pane enables you to work with data, add objects, and use the report outline to organize your content.

The right pane enables you to work with details about the report, its pages, and its objects.

To start with, let's check the distribution of Organics Purchase Indicator, but before drop the data item into your Visualization window, you must change the level Measure to Category just with clicks on it.

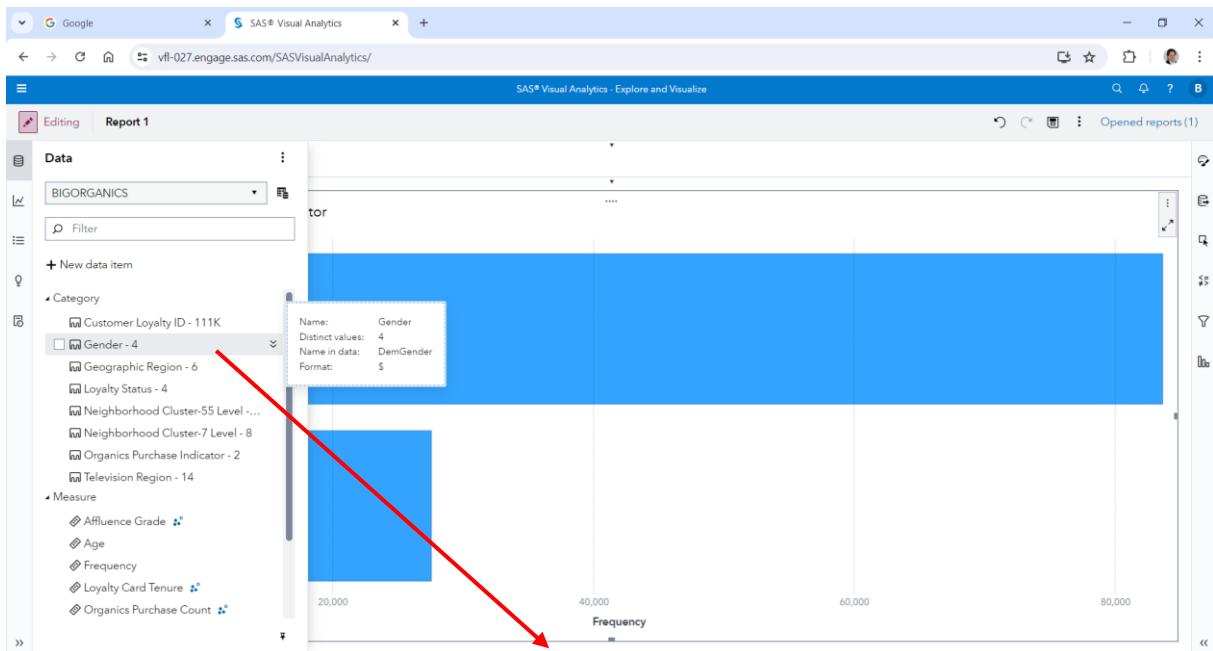
This screenshot is similar to the one above, but the 'Classification' dropdown menu under the 'Measure' section is open, revealing options: 'Measure', 'Category', 'Geography', 'Measures', and 'Default (Sum)'. The 'Category' option is highlighted with a red circle. The rest of the interface and the red arrows pointing to the panes are identical to the first screenshot.

The screenshot shows the SAS Visual Analytics Data pane. A red arrow points to the 'Organics Purchase Indicator' data item in the list, which is highlighted with a blue border. The pane also shows other categories like 'Category' and 'Measure' with their respective items.

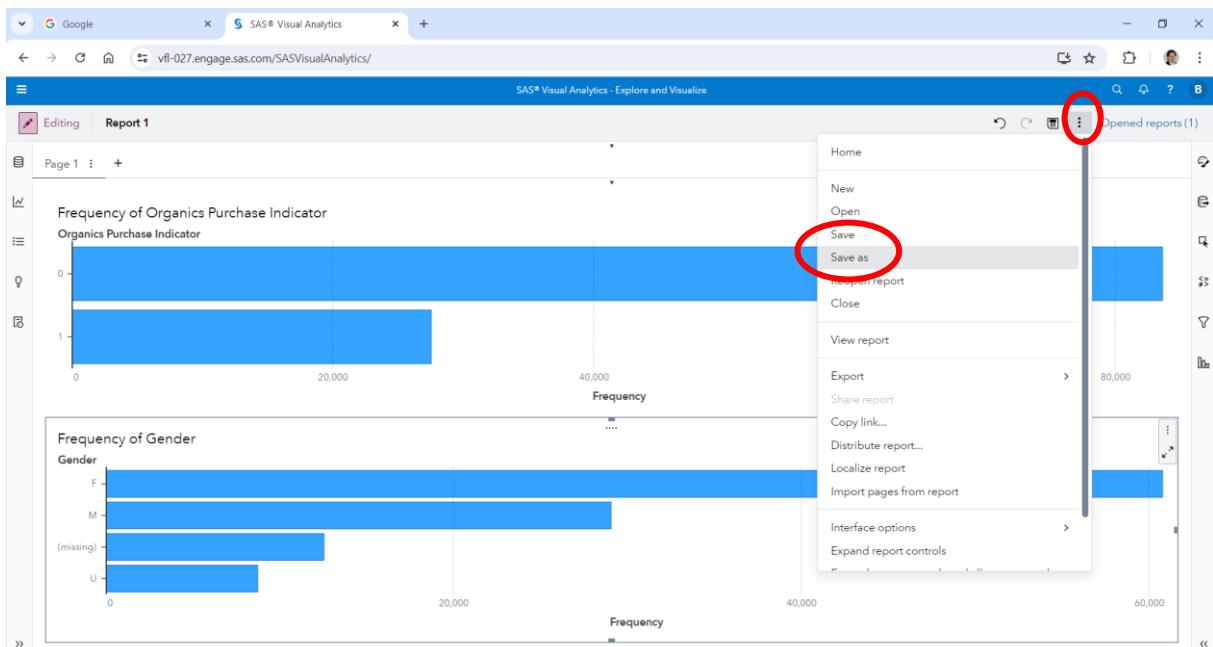
Drop the data item into your Visualization window

The screenshot shows the SAS Visual Analytics Visualization pane. It displays a bar chart titled 'Frequency of Organics Purchase Indicator'. The Y-axis has two categories: 0 and 1. The X-axis is labeled 'Frequency' and ranges from 0 to 80,000. There are two bars: one for category 0 reaching approximately 80,000, and one for category 1 reaching approximately 20,000.

Check the distribution of Customers Gender, just drop the data item Gender into your Visualization window.



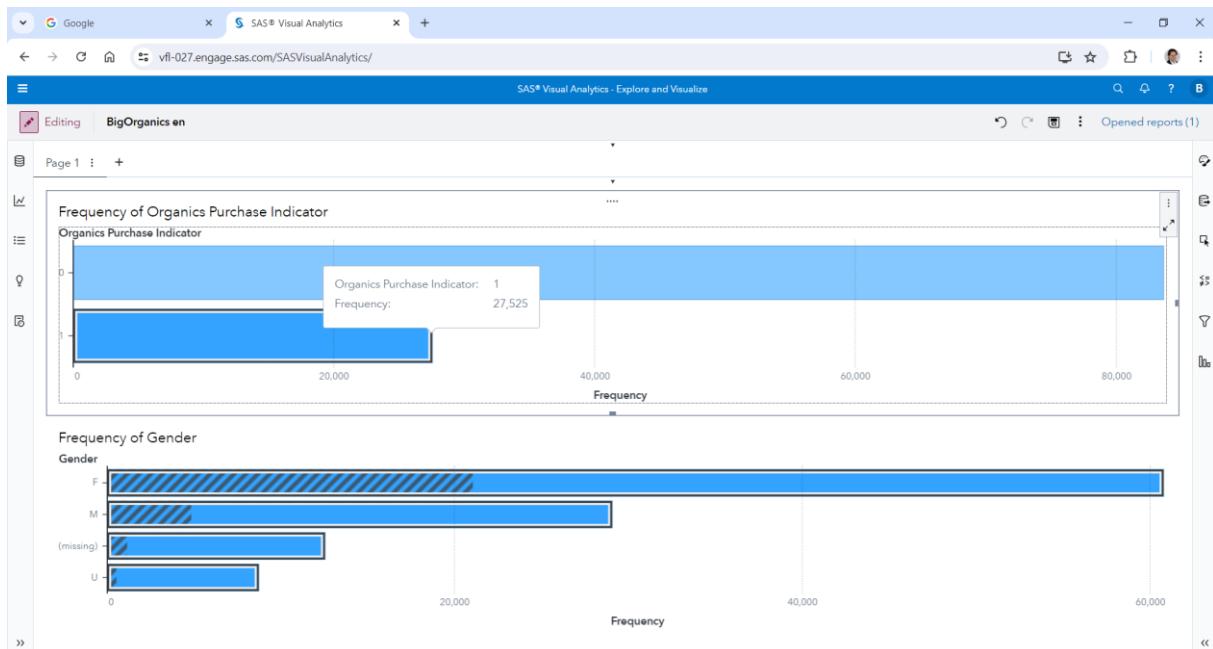
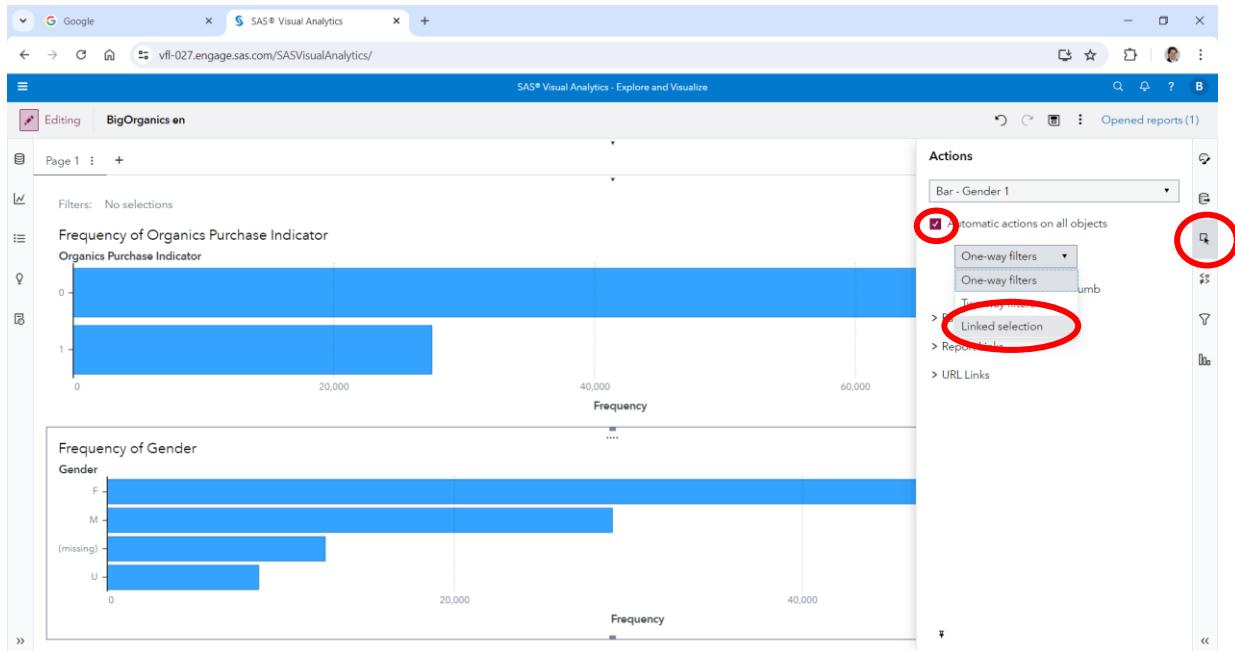
Save frequently your report



Save in your folder

Select one graph, go to Actions on the right, select Automatic actions on all objects and Linked selection.

If you click on female in the gender graph, you can see that in proportion, female by more organic's products.



You can create a new page

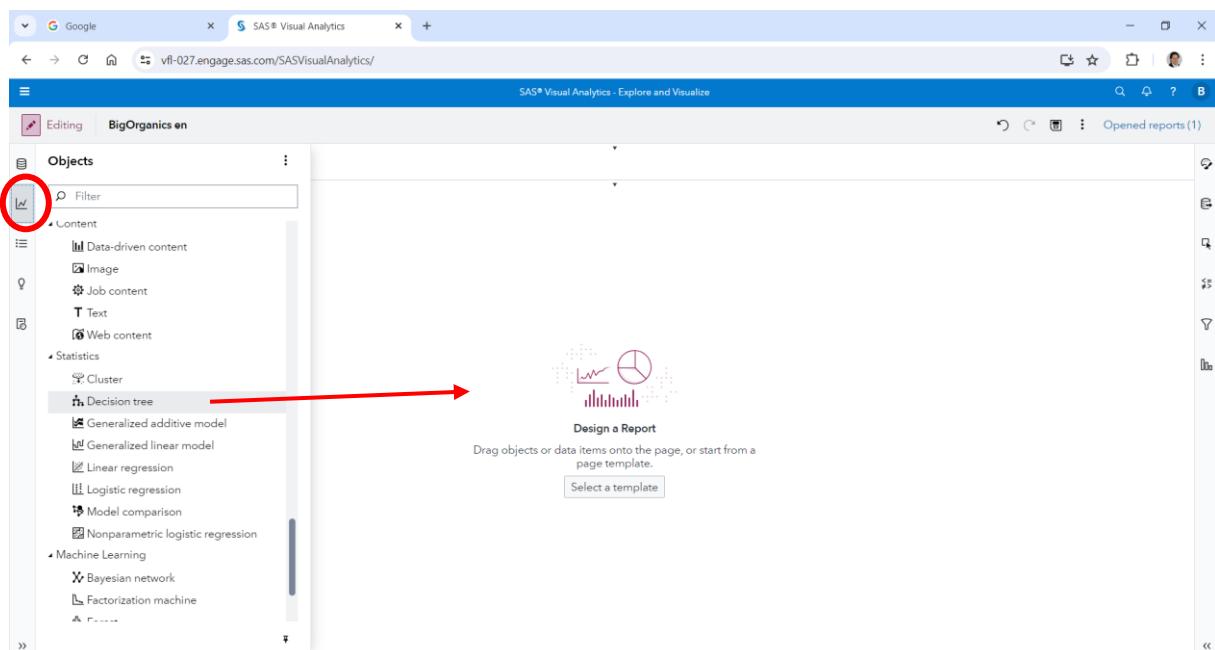
Decision Trees

A decision tree creates a segmentation of the data based on a series of rules. Each rule assigns an observation to a node based on the value of one predictor. Rules are applied sequentially, which results in a hierarchy called a tree. The initial node contains the entire data set and is called the root node. A node and all of its successors form a branch. The final nodes are called leaves. For each leaf, a decision is made about the response variable.

A decision tree is a supervised Predictive Model, in the sense that it requires one Target variable and at least one predictor. The Target can be a category variable (Classification Tree) or a measure variable (Regression Tree). A predictor can be a category or measure variable, but not an interaction term. A decision tree will be automatically built, but you can also manually train and prune nodes by entering interactive mode.

Now let's build a decision tree to predict who is likely to purchase organic products.

You can create a new page.



Drop Decision Tree from Objects → SAS Visual Statistics

We want to build a classification tree, so we want a categorical variable, our **Organics Purchase Indicator**.

On, the right, in Roles, Add **Organics Purchase Indicator** as Response.

Add the following variables as **predictors**: Gender, Geographic Region, Loyalty Status, Television Region, Affluence Grade, Age, Loyalty Card Tenure and Total Spend.

OK

Logistic Regression

A logistic regression attempts to predict the value of a binary response variable. A logistic regression model approximates the probability that an individual observation to belong to the level of interest. It requires a category Target (or Response) variable and at least one effect variable or interaction term.

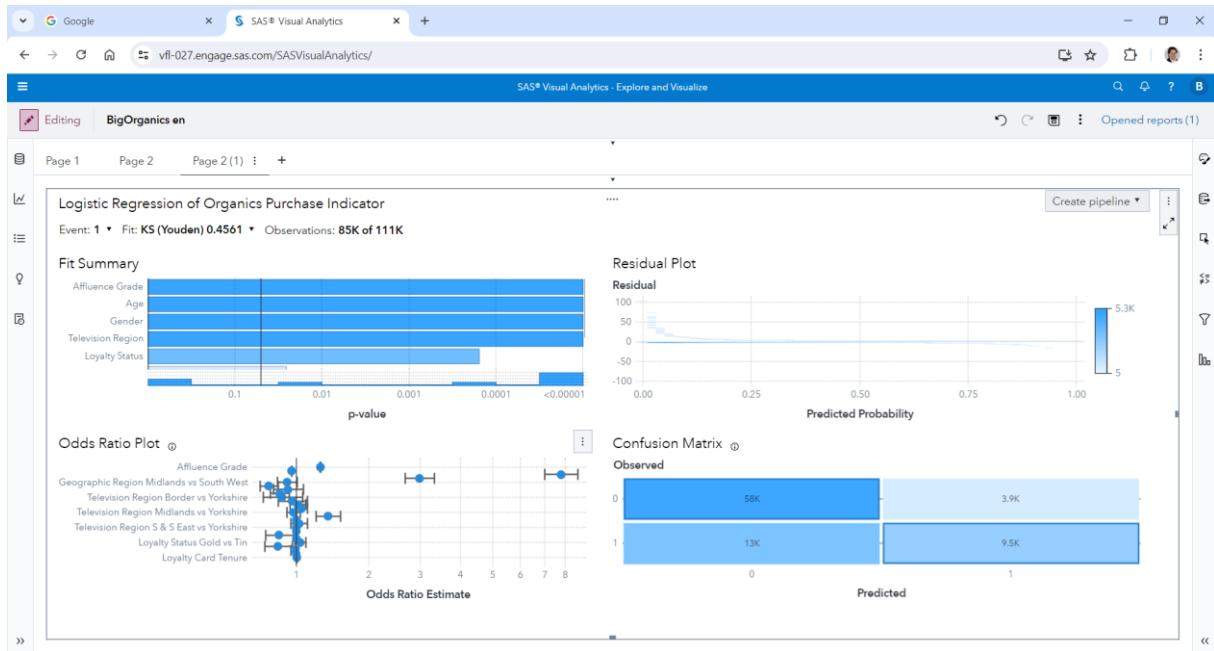
So let's create a Logistic Regression model to predict who is likely to purchase organic products.

The screenshot shows the SAS Visual Analytics interface. On the left, there is a navigation pane with a tree structure. A context menu is open over 'Page 2', with the 'Duplicate page' option highlighted and circled in red. The main content area displays a decision tree titled 'Decision Tree of Organics Purchase Indicator'. The tree has 'Age' as the root node, splitting into 'Affluent' and 'Non-Affluent'. Further splits lead to 'Gender' and 'Geographic Region'. The 'Organics Purchase Indicator' bar chart shows values for 0 and 1 across different segments. To the right, there are two charts: 'Variable Importance' (bar chart showing Age, Affluence Grade, Gender, Geographic Region, Loyalty Card Tenure) and 'Confusion Matrix' (matrix showing Observed vs Predicted values for 0 and 1).

Duplicate page

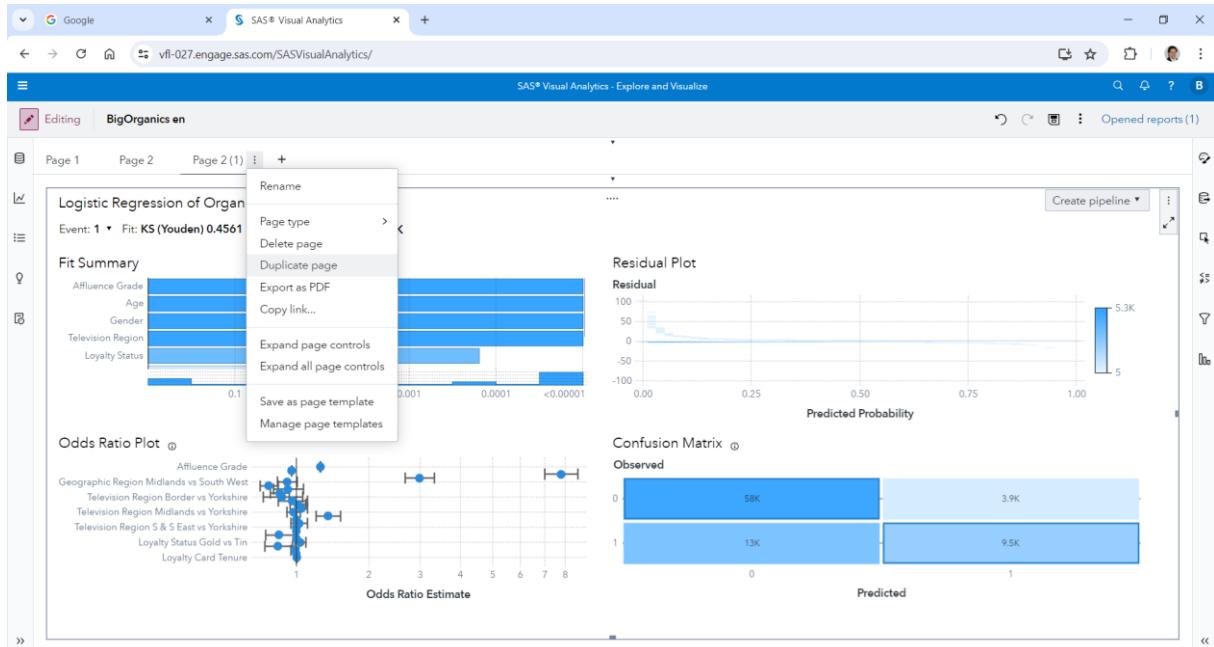
This screenshot shows the same SAS Visual Analytics interface as above, but with a different context menu. The 'Duplicate page' option is still present but not highlighted. Instead, the 'Change Decision tree to...' option is highlighted and circled in red. The main content area remains the same, displaying the decision tree and associated charts. The context menu also includes options like 'Automated explanation', 'Bayesian network', 'Cluster', 'Factorization machine', 'Forest', 'Generalized additive model', 'Generalized linear model', 'Gradient boosting', 'Linear regression', 'Logistic regression', 'Neural network', 'Nonparametric logistic regression', and 'Support vector machine'.

Change Decision Tree to Logistic Regression

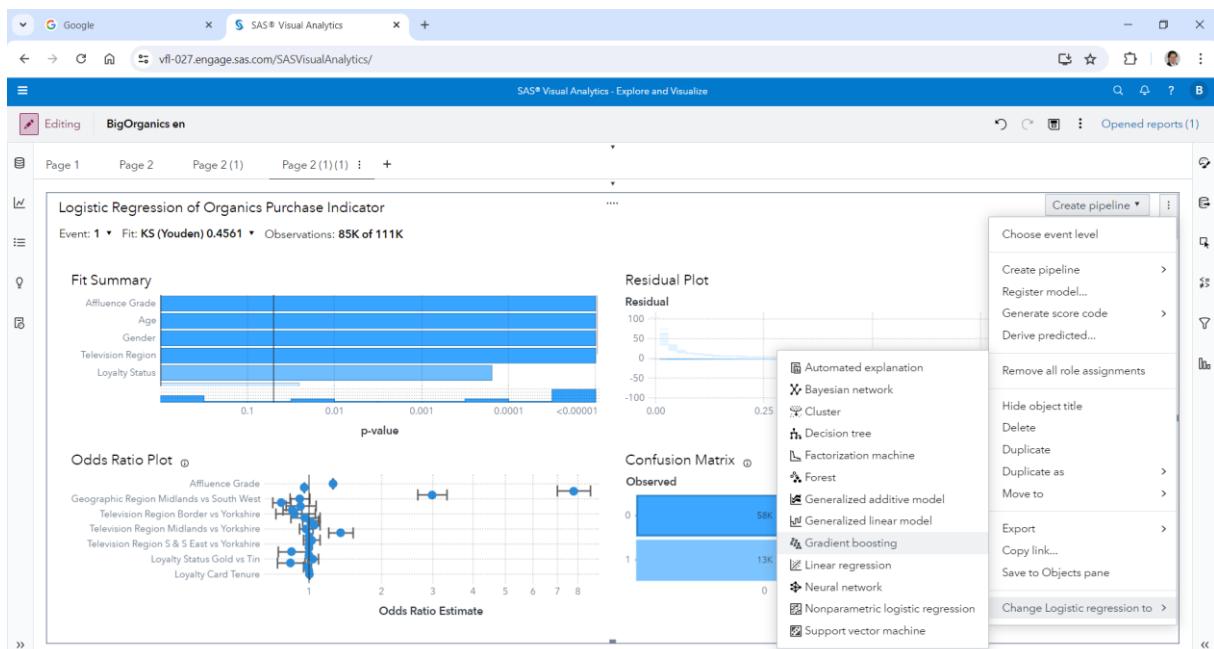


Gradient Boosting

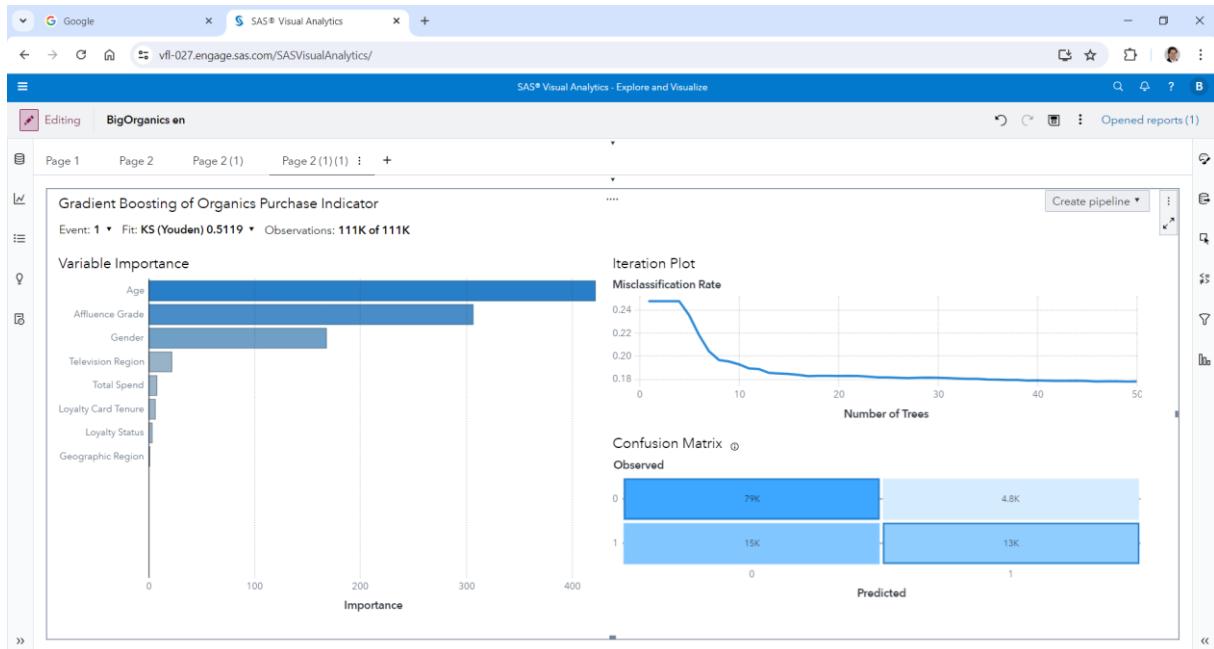
Gradient boosting is a machine learning technique for regression and classification problems, which produces a prediction model in the form of an ensemble of decision trees.



Duplicate page



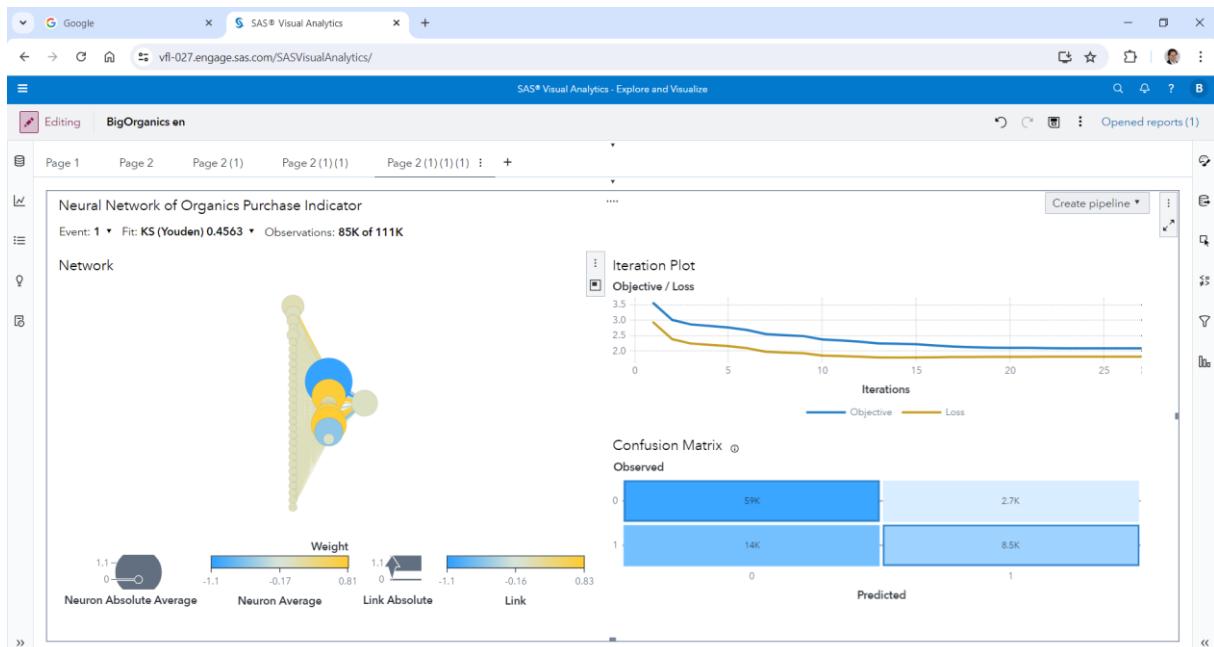
Change Logistic Regression to Gradient Boosting



Neural Network

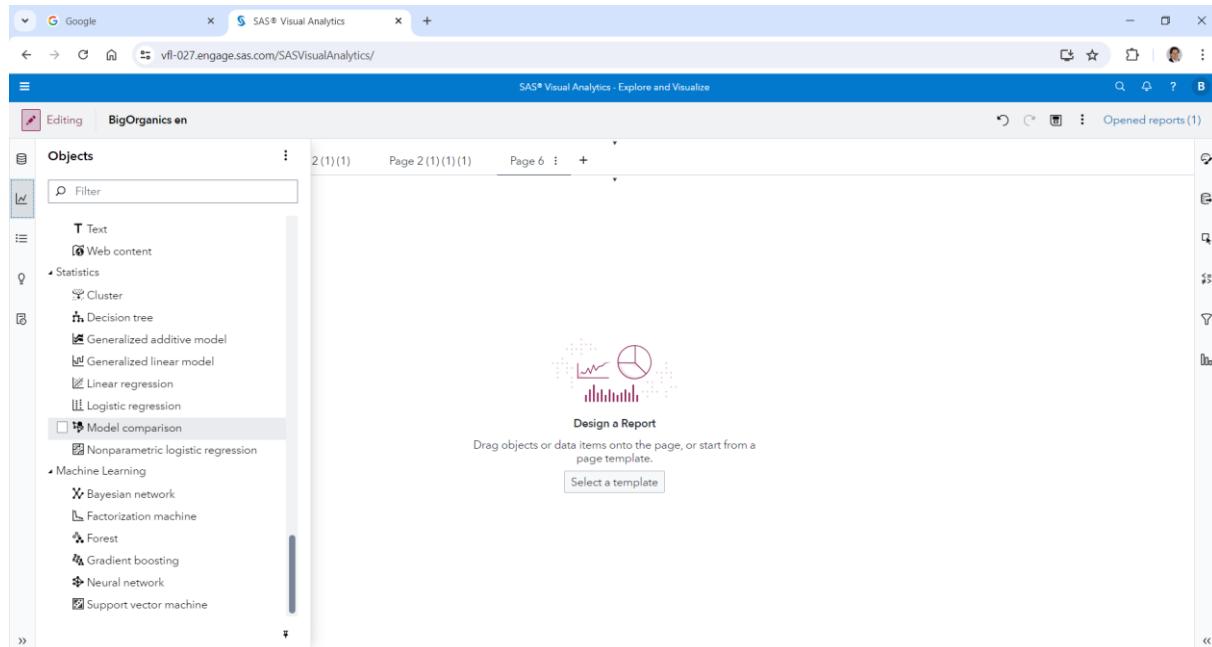
Duplicate page

Change Gradient Boosting to Neural Network

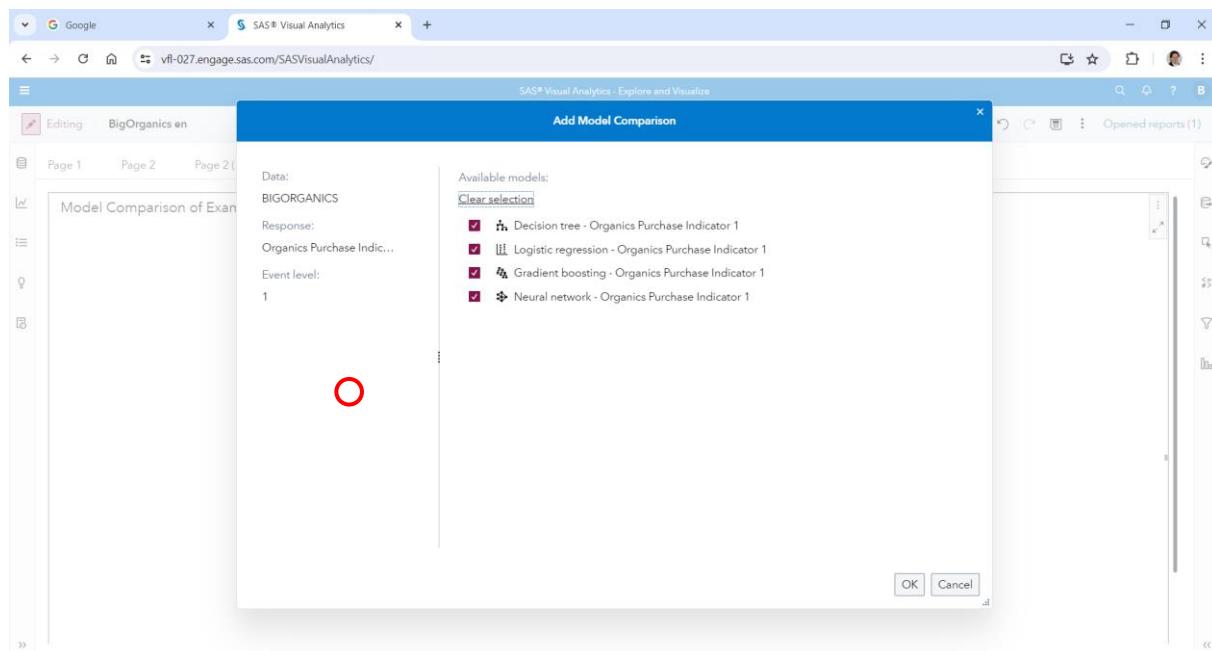


Model Comparison

You can create a new page.

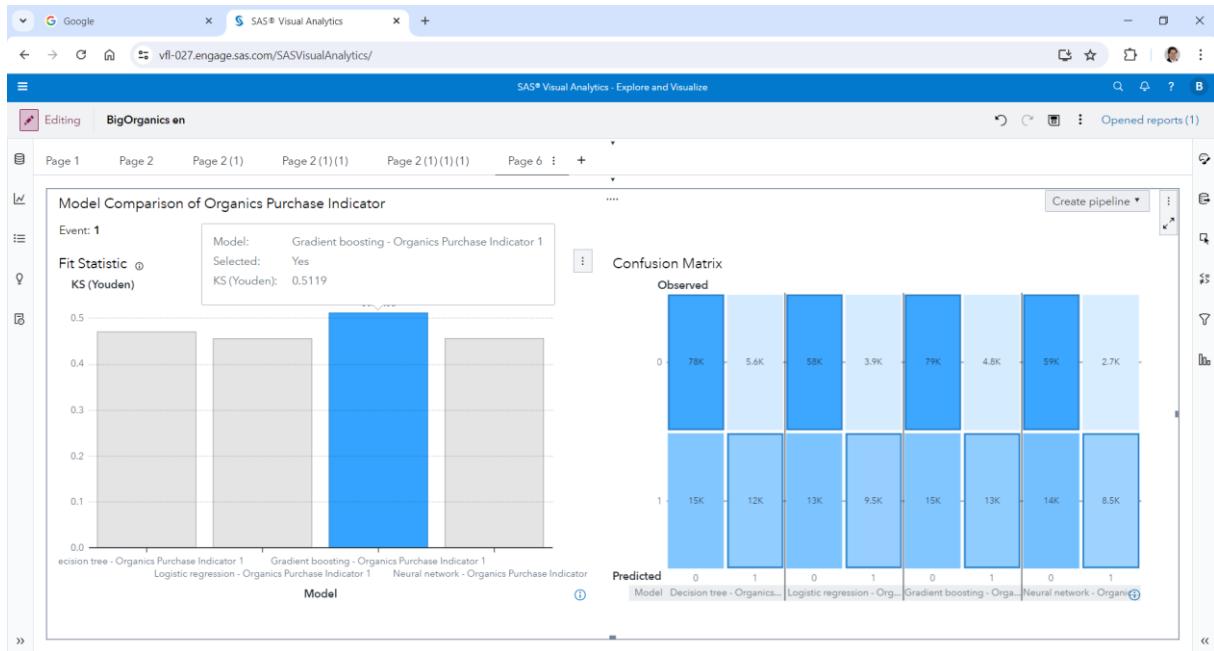


Drop Model Comparison from Objects on the left.

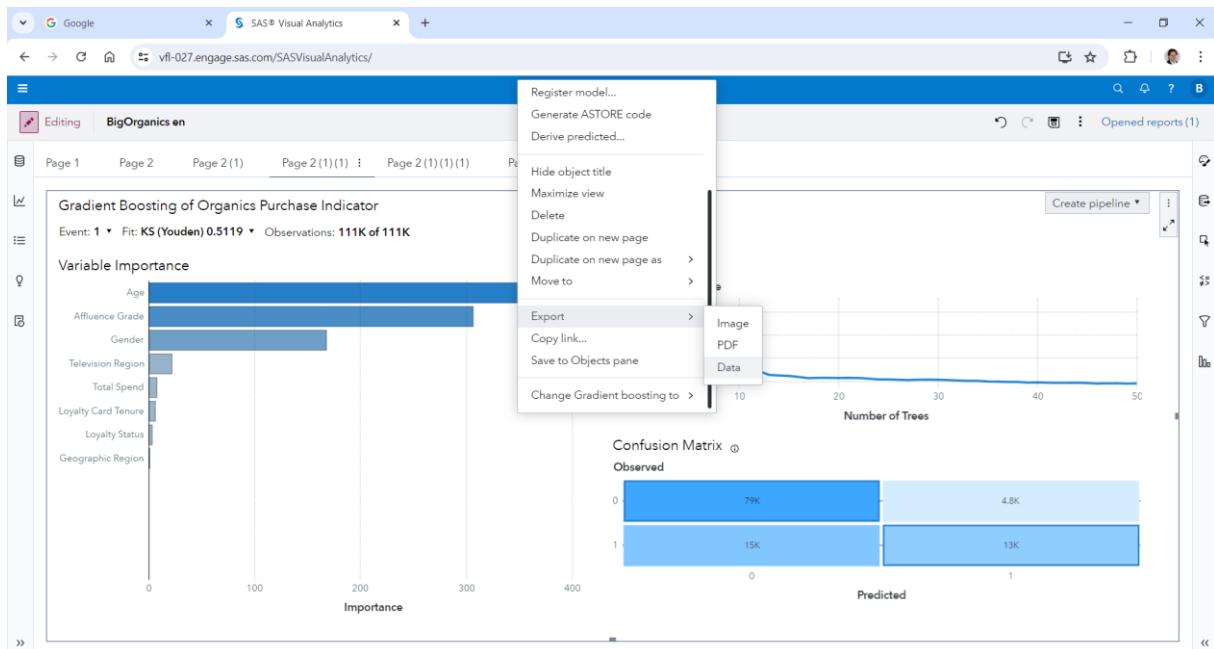


Select all

OK

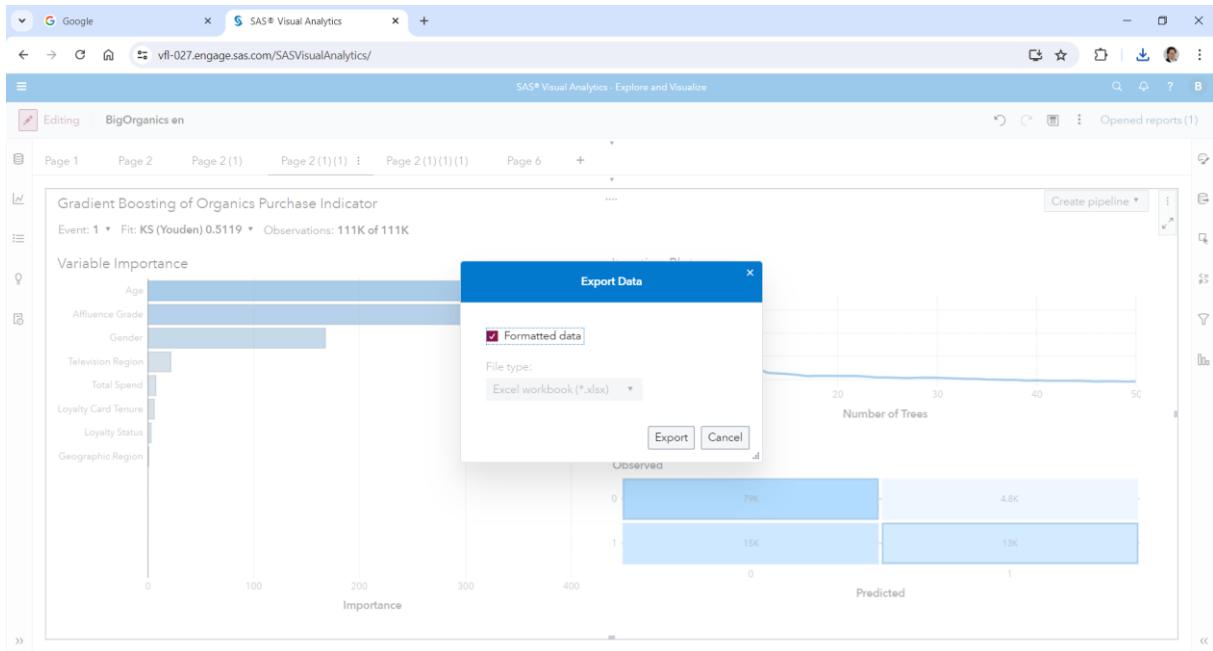


The best model is the Gradient Boosting according to the KS (Youden) statistic and the lift curve.



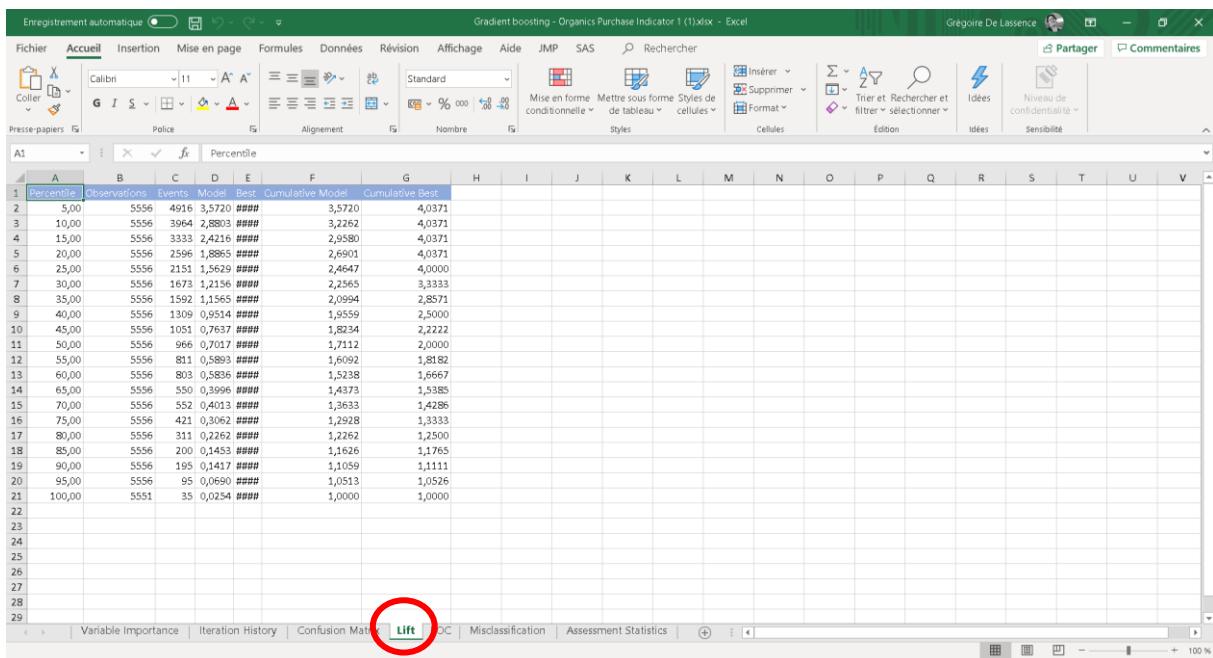
Go back to page 2(1)(1): Gradient boosting

Right click in the middle → Export - data



OK

Open the downloaded Excel file



Go to Lift Sheet
Create a ROI column

Gradient Boosting - Organics Purchase Indicator.xlsx - Lecture seule - Excel

Fichier Accueil Insertion Mise en page Formules Données Révision Affichage Aide SAS Rechercher des outils adaptés

Presse-papiers Police Alignement Nombre Styles Styles de tableau Supprimer Format Cellules Édition

H2 fx =100000*A2/100*(-2+5*F2*25/100)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Percentile	Observations	Events	Model Best	Cumulative Model	Cumulative Best	ROI														
2	5,00	5556	5021	3,6483 ####	3,6483	4,0371	12802														
3	10,00	5556	3976	2,8890 ####	3,2687	4,0371	20858,31														
4	15,00	5556	3216	2,3368 ####	2,9580	4,0371	25463,22														
5	20,00	5556	2664	1,9357 ####	2,7025	4,0371	27561,31														
6	25,00	5556	2078	1,5099 ####	2,4639	4,0000	26998,18														
7	30,00	5556	1760	1,2788 ####	2,2664	3,3333	24990,92														
8	35,00	5556	1491	1,0834 ####	2,0974	2,8571	21762,03														
9	40,00	5556	1377	1,0005 ####	1,9603	2,5000	18015,44														
10	45,00	5556	1057	0,7680 ####	1,8278	2,2222	12815,62														
11	50,00	5556	870	0,6322 ####	1,7083	2,0000	6766,576														
12	55,00	5556	880	0,6394 ####	1,6111	1,8182	762,9428														
13	60,00	5556	712	0,5174 ####	1,5200	1,6667	-6003,07														
14	65,00	5556	618	0,4490 ####	1,4376	1,5385	-13197,1														
15	70,00	5556	545	0,3960 ####	1,3632	1,4286	-2072,1														
16	75,00	5556	410	0,2979 ####	1,2922	1,3333	-28860,1														
17	80,00	5556	300	0,2180 ####	1,2250	1,2500	-37497,7														
18	85,00	5556	235	0,1708 ####	1,1630	1,1765	-46430,5														
19	90,00	5556	171	0,1243 ####	1,1053	1,1111	-55654														
20	95,00	5556	109	0,0792 ####	1,0513	1,0526	-65158,9														
21	100,00	5551	35	0,0254 ####	1,0000	1,0000	-75000														

Variable Importance Iteration History Lift Misclassification ROC Assessment Statistics

Moyenne : 7486,347639 Nb (non vides) : 20 Somme : 149726,9520

For the first cell, the formula (in cell H2) is

$$=100000 \cdot A2/100 \cdot (-2+5 \cdot F2 \cdot 25/100)$$

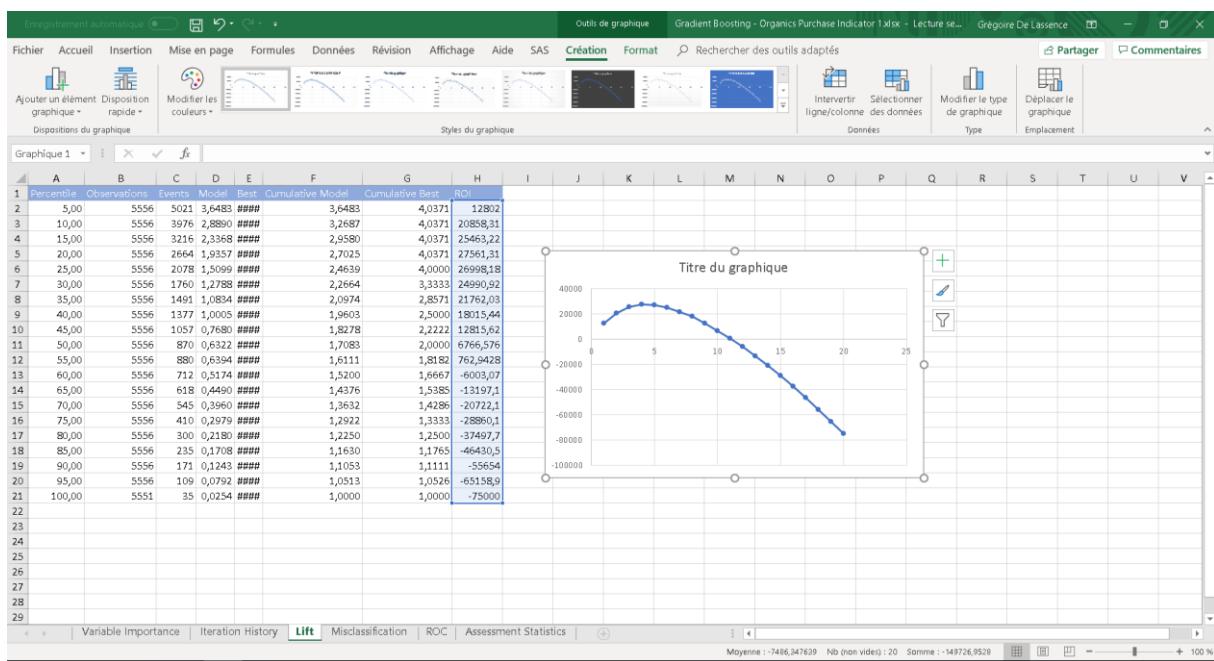
They is more than 100 000 customer in the Organics Table

25/100 : they is 25% of customer who by organic's products. That the default base rate in this case.

The cost of sending a letter is 2£. The Benefits is 5£.

If we select the 5% who've got the highest probability to by a product and send an advertise, the default return rate from 25% will be multiply by the lift from the model (3,64¹ at 5%). The ROI will be 12 802£.

Use can use the ROI formula to the all column



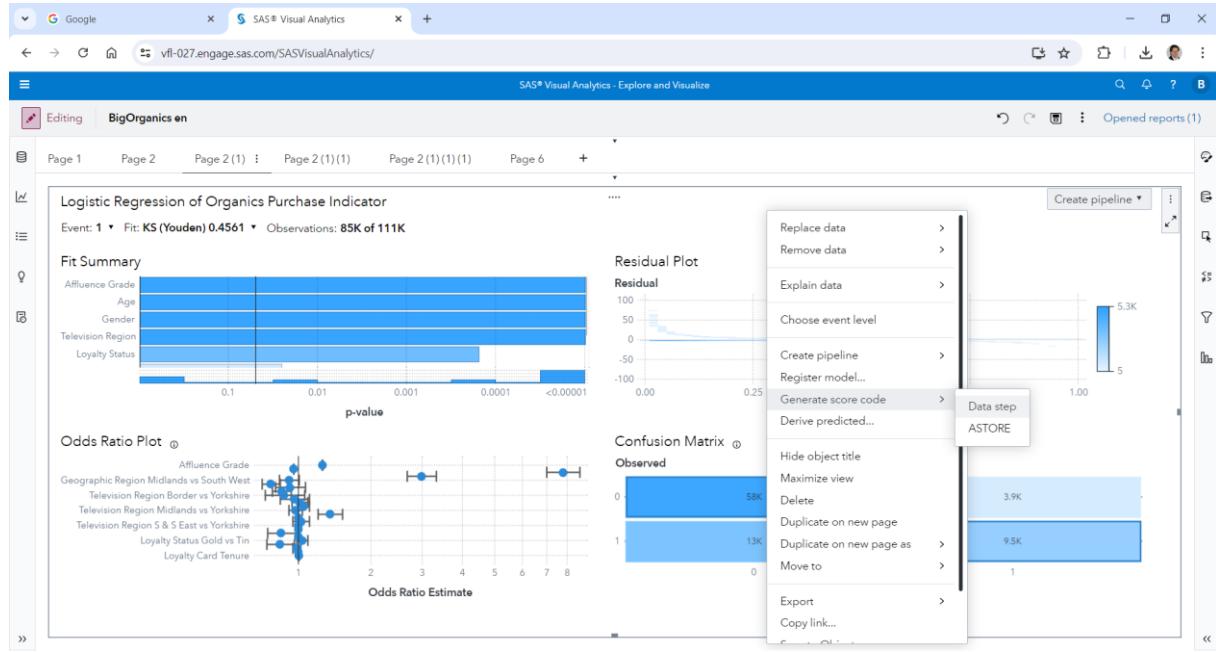
The maximum of the ROI is at 20%.

¹ SAS Viya compute Algorithms on data in block in memory, in parallel. All results ca be a little different.

If we select the 5% who has the highest probability to buy a product, we must get 12 802£ back.
 If we select the 20% who has the highest probability to buy a product, we must get 27 561£ back.

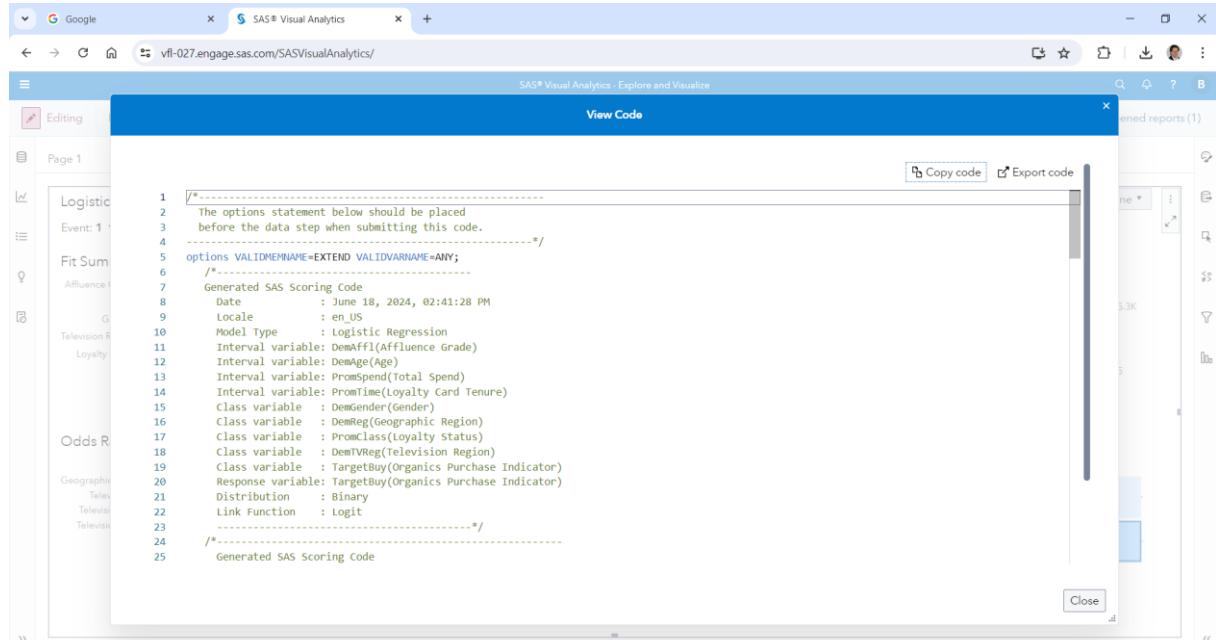
Score today table

Go back to SAS Visual Analytics



Go to page 2 (1): Logistic Regression

Right click in the middle → Generate score code → Data step



Select all (Ctrl + A)

Copy all (Ctrl + C)

Close

In the top left corner,

The screenshot shows two instances of the SAS Visual Analytics interface side-by-side. Both reports are titled "Logistic Regression of Organics Purchase Indicator".
The top report's sidebar is visible, showing the "Analytics Life Cycle" navigation pane on the left with the following options:

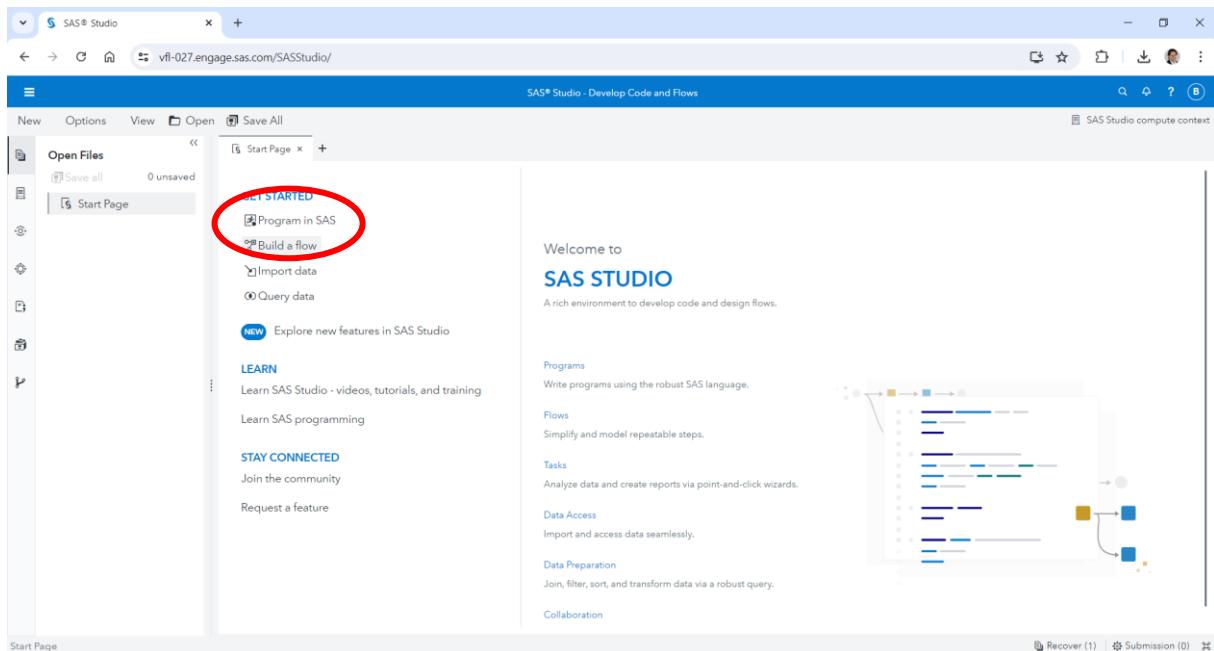
- Discover Information Assets
- Manage Data
- Explore and Visualize
- Build Models
- Manage Models
- Share and Collaborate
- Develop Code and Flows** (this option is highlighted with a red circle)
- Administration
 - Build Custom Graphs
 - Manage Themes
 - Explore Lineage
 - Manage Environment
 - Manage Workflows

The main content area of the top report displays four charts:

- Fit Summary:** A horizontal bar chart showing p-values for various variables: Affluence Grade (~0.001), Age (~0.0001), Gender (~0.0001), Television Region (~0.0001), and Loyalty Status (<0.00001).
- Residual Plot:** A histogram of residuals with a normal distribution curve overlaid. The x-axis is "Predicted Probability" (0.00 to 1.00) and the y-axis is "Residual" (-100 to 100). A vertical bar indicates a value of 5.3K at the far right.
- Odds Ratio Plot:** A scatter plot of Odds Ratio Estimate (log scale from 1 to 8) versus variable names. Points include Affluence Grade (~1.5), Geographic Region Midlands vs South West (~1.5), Television Region Border vs Yorkshire (~2.5), Television Region Midlands vs Yorkshire (~3.5), Television Region S & S East vs Yorkshire (~7.5), Loyalty Status Gold vs Tin (~1.5), and Loyalty Card Tenure (~1.5).
- Confusion Matrix:** A 2x2 matrix showing observed vs predicted values. Rows are Observed (0, 1) and Columns are Predicted (0, 1). Values: (0,0) 58K, (0,1) 3.9K, (1,0) 13K, (1,1) 9.5K.

The bottom report is identical in structure and content but lacks the sidebar on the left.

Select “Develop SAS code”



Program in SAS

Past the code you copy and before, copy the following code

```
cas;
caslib _all_ assign;
```

```
Data MyOrganicsTableScored;
set tundata.bigorganics;
```

"

The screenshot shows the SAS Studio code editor with a file named 'SAS Program.sas' open. The code is:

```
cas;
caslib _all_ assign;
Data MyOrganicsTableScored;
set tundata.bigorganics;
/*
The options statement below should be placed
before the data step when submitting this code.
options VALIDMEMNAME=EXTEND VALIDVARNAME=ANY;
*/
Generated SAS Scoring Code
Date : June 18, 2024, 02:41:28 PM
Locale : en_US
Model Type : Logistic Regression
Interval variable: DemAffl(Affluence Grade)
Interval variable: DemAge(Age)
Interval variable: PromSpend(Total Spend)
Interval variable: PromTime(Loyalty Card Tenure)
Class variable : DemGender(Gender)
Class variable : DemReg(Geographic Region)
Class variable : PromClass(Loyalty Status)
Class variable : DemVReg(Television Region)
Class variable : TargetBuy(Organics Purchase Indicator)
Response variable: TargetBuy(Organics Purchase Indicator)
```

The editor includes tabs for 'Run', 'Cancel', 'Copy to My Snippets', 'Code to Flow', 'Debug', and 'Clear Log'. The log pane shows 'Errors (0)', 'Warnings (0)', and 'Notes (0)'. A message at the bottom says 'There are no messages.'

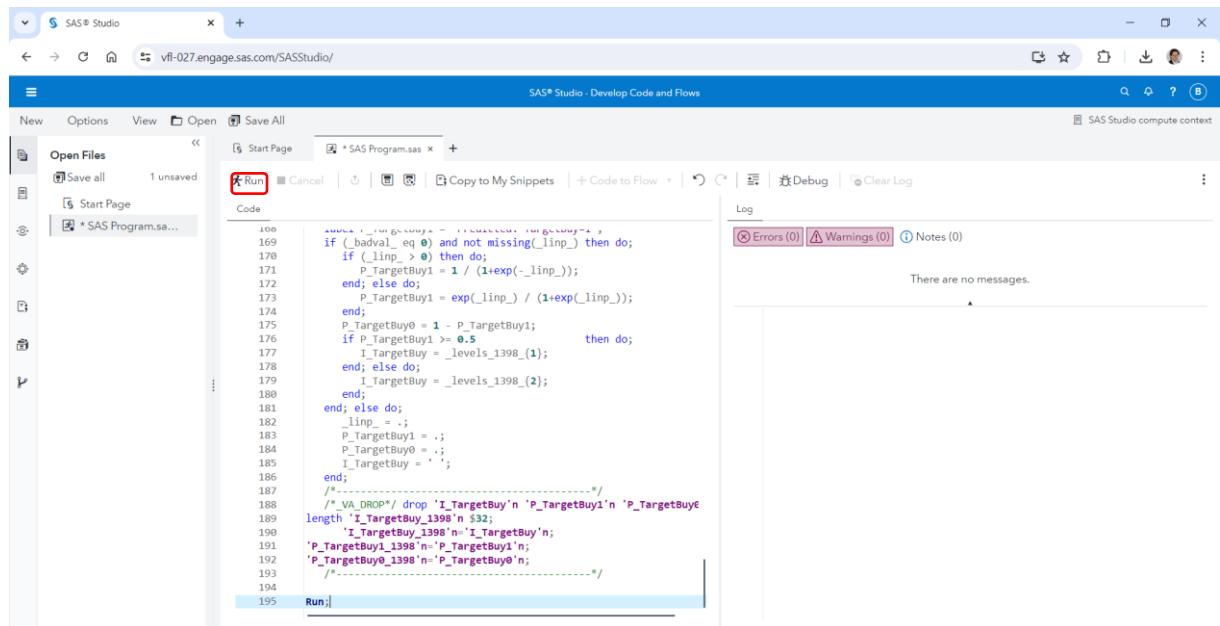
Go to the top bottom from the code, and tape

"

Run;

"

Then, click on run to Submit



SAS® Studio - Develop Code and Flows

New Options View Open Save All Start Page * SAS Program.sas +

Run Cancel Copy to My Snippets Code to Flow Debug Clear Log

Code

```
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
```

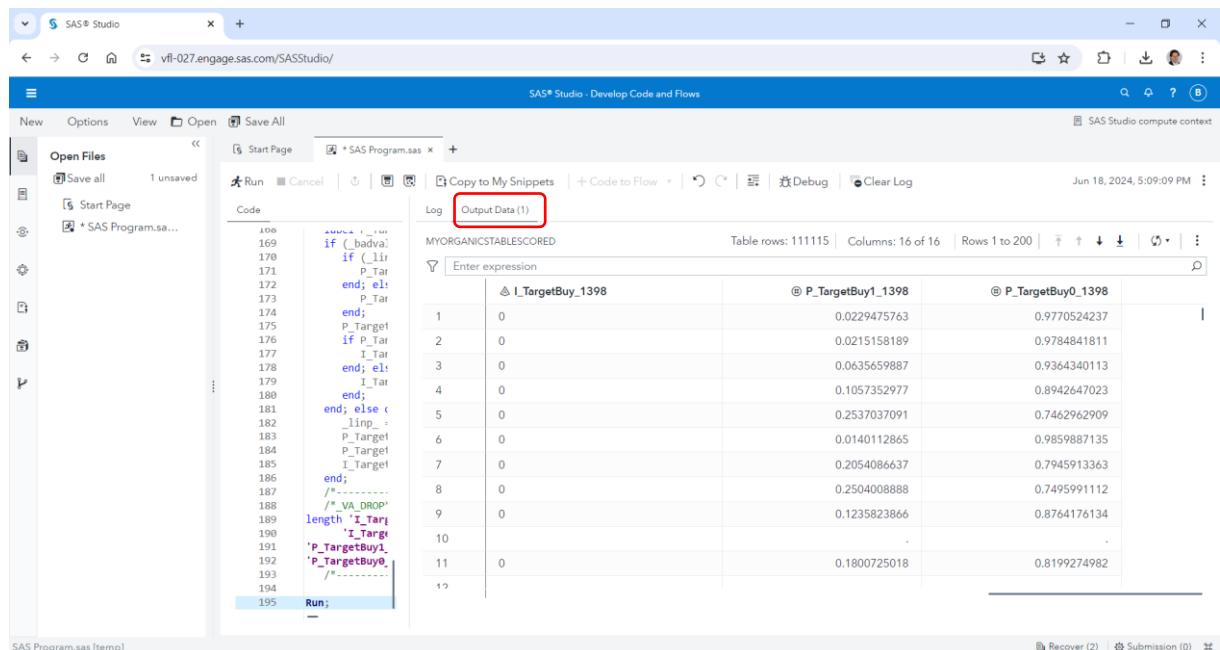
Run; [highlighted]

Log

Errors (0) Warnings (0) Notes (0)

There are no messages.

SAS Program.sas [temp] Line 195 Column 5 UTF-8 Recover (2) Submission (0)



SAS® Studio - Develop Code and Flows

New Options View Open Save All Start Page * SAS Program.sas +

Run Cancel Copy to My Snippets Code to Flow Debug Clear Log Jun 18, 2024, 5:09:09 PM

Log Output Data (1)

MYORGANICSTABLESCORED Table rows: 111115 | Columns: 16 of 16 | Rows 1 to 200

Enter expression

	④ I_TargetBuy_1398	④ P_TargetBuy1_1398	④ P_TargetBuy0_1398
1	0	0.0229475763	0.9770524237
2	0	0.0215158189	0.9784841811
3	0	0.0635659887	0.9364340113
4	0	0.1057352977	0.8942647023
5	0	0.2537037091	0.7462962909
6	0	0.0140112865	0.9859887135
7	0	0.2054086637	0.7945913363
8	0	0.2504008888	0.7495991112
9	0	0.1235823866	0.8764176134
10	-	-	-
11	0	0.1800725018	0.8199274982
12	-	-	-

SAS Program.sas [temp] Recover (2) Submission (0)

In the Output Data, you can sort the table descending by the P_TargetBuy1_xxx column

Right-click on P_TargetBuy1_xxx column name, sort → Descending

SAS Program.sas [temp]

	P_TargetBuy1_1398	P_TargetBuy0_1398
1	0.0229	0.9859887135
2	0.0215	0.7945913363
3	0.0635	0.7495991112
4	0.1057	0.8764176134
5	0.2537	0.8199274982
6	0.0140	-
7	0.2054	-
8	0.2504008888	-
9	0.1235823866	-
10	-	-
11	0.1800725018	-
12	-	-

SAS Program.sas [temp]

	P_TargetBuy1_1398	P_TargetBuy0_1398
1	0.9979369212	0.0020630788
2	0.9979369212	0.0020630788
3	0.9979369212	0.0020630788
4	0.9979369212	0.0020630788
5	0.9979369212	0.0020630788
6	0.9963138555	0.0036861445
7	0.9963138555	0.0036861445
8	0.9963138555	0.0036861445
9	0.9963138555	0.0036861445
10	0.9963138555	0.0036861445
11	0.9963101119	0.0036898881
12	0.9963101119	0.0036898881
13	0.0042101110	0.0036898881

Go back to SAS Visual Analytics, on top left corner, click on “Explore and Visualize”.

The screenshot shows the SAS Studio interface with a code editor and a results pane.

Code Editor:

```
168  *-----  
169  if (_badval,  
170    if (_lir,  
171      p_tar  
172    end; else  
173      p_tar  
174    end;  
175  p_target  
176  if p_tar  
177    l_tar  
178  end; else  
179    l_tar  
180  end;  
181  end; else if  
182    length  
183    'P_TargetBuy1'  
184    'P_TargetBuy0'  
185    'P_TargetBuy1'  
186    'P_TargetBuy0'  
187  /*-----  
188  /*_VA_DROP'  
189  length 'L_Tar  
190  'L_Tar  
191  'P_TargetBuy1'  
192  'P_TargetBuy0'  
193  /*-----  
194  
195 Run;
```

Results Pane:

	Table rows: 111115	Columns: 16 of 16	Rows 1 to 200
1	I_TargetBuy_1398	④ P_TargetBuy1_1398 ↓	④ P_TargetBuy0_1398
2	1	0.9979369212	0.0020630788
3	1	0.9979369212	0.0020630788
4	1	0.9979369212	0.0020630788
5	1	0.9979369212	0.0020630788
6	1	0.9963138555	0.0036861445
7	1	0.9963138555	0.0036861445
8	1	0.9963138555	0.0036861445
9	1	0.9963138555	0.0036861445
10	1	0.9963138555	0.0036861445
11	1	0.9963101119	0.0036898881
12	1	0.9963101119	0.0036898881
13	1	0.0042101110	0.0024000001

Save your report as

Exercises

Create a new report on the table PVA and redo the same stuff as you do on Bigorganics.

A national veterans' organization seeks to better target its solicitations for donation. By soliciting only the most likely donors, less money is spent on solicitation efforts and more money is available for charitable concerns. Solicitations involve sending a small gift to an individual and include a request for a donation. Gifts to donors include mailing labels and greeting cards.

Name	Description	Role
DemAge	Age	Predictor
DemCluster	Demographic Cluster	Predictor
DemGender	Gender	Predictor
DemHomeOwner	Home Owner	Predictor
DemMedHomeValue	Median Home Value Region	Predictor
DemMedIncome	Median Income Region	Predictor
DemPctVeterans	Percent Veterans Region	Predictor
GiftAvg36	Gift Amount Average 36 Months	Predictor
GiftAvgAll	Gift Amount Average All Months	Predictor
GiftAvgCard36	Gift Amount Average Card 36 Months	Predictor
GiftAvgLast	Gift Amount Last	Predictor
GiftCnt36	Gift Count 36 Months	Predictor
GiftCntAll	Gift Count All Months	Predictor
GiftCntCard36	Gift Count Card 36 Months	Predictor
GiftCntCardAll	Gift Count Card All Months	Predictor
GiftTimeFirst	Time Since First Gift	Predictor
GiftTimeLast	Time Since Last Gift	Predictor
ID	Control Number	Don't use
PromCnt12	Promotion Count 12 Months	Predictor
PromCnt36	Promotion Count 36 Months	Predictor
PromCntAll	Promotion Count All Months	Predictor
PromCntCard12	Promotion Count Card 12 Months	Predictor
PromCntCard36	Promotion Count Card 36 Months	Predictor
PromCntCardAll	Promotion Count Card All Months	Predictor
StatusCat96NK	Status Category 96NK	Predictor
StatusCatStarAll	Status Category Star All Months	Predictor
TARGET_B	Target Gift Flag	Response
TARGET_D	Target Gift Amount	Don't use
TARGET_D_with zero	Target Gift Amount with zero	Don't use

For the Rol,
average cost = 2\$
Margin = 3\$

Print your report: it will create a pdf. Save the pdf and the Excel file and send them by mail to our professor.

Videos :

Prepare SAS Base Programming Specialist Certification using SAS Skill Builder for Students

<https://www.youtube.com/watch?v=FTKjpeb95l0>

Prepare SAS® Visual Business Analytics Specialist Certification using SAS Skill Builder for Students

<https://www.youtube.com/watch?v=USAAdNdBM8Bo>

SAS versus Open source

<https://www.youtube.com/watch?v=XY7832A8H4s>