

# **Bicycle Sales Analytics Using IBM Cognos**

**A Project Report**

**Data Analytics**

**Submitted By:**

**K.R.CHETAN**

**19BIT0049**

**VIT VELLORE**

## **Introduction Overview**

Adventure Works is a sample database created for use in demos and training on each version of Microsoft SQL Server. The name Adventure Works refers to a fictitious large, multinational bicycle manufacturing company. "The company manufactures and sells metal and composite bicycles to North American, European and Asian commercial markets. While its base operation is located in Washington with 290 employees, several regional sales teams are located throughout their market base. In 2000, Adventure Works Cycles bought a small manufacturing plant, in Mexico. This manufactures several critical subcomponents for the Adventure Works Cycles product line. In 2001, they became the sole manufacturer and distributor of the touring bicycle product group. Coming off a successful fiscal year, Adventure Works Cycles is looking to broaden its market share by targeting their sales to their best customers, extending their product availability through an external Web site, and reducing their cost of sales through lower production costs."

### **Goal :**

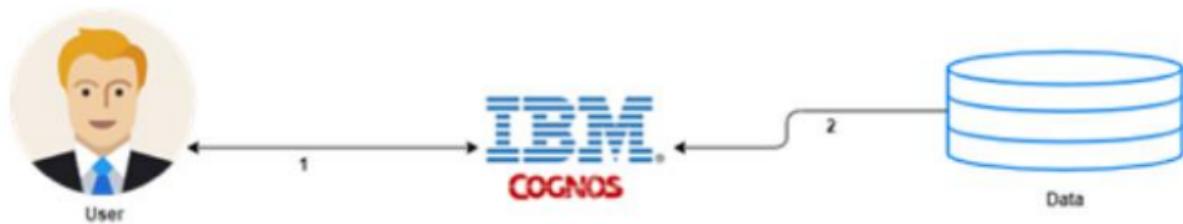
Goal of this problem statement is to find and provide various Sales Analytics for the improvement of the Organization.

The main objective to do this project was to:

- Know Fundamental concepts and can work on Cognos Analytics
- Able to Analyze the given problem using Forecasting, Trend Lines
- Build Scatter and Density Plots, Correlation Matrix.
- Gain a broad understanding of plotting different graphs
- Able to create meaningful dashboards

## Architecture:

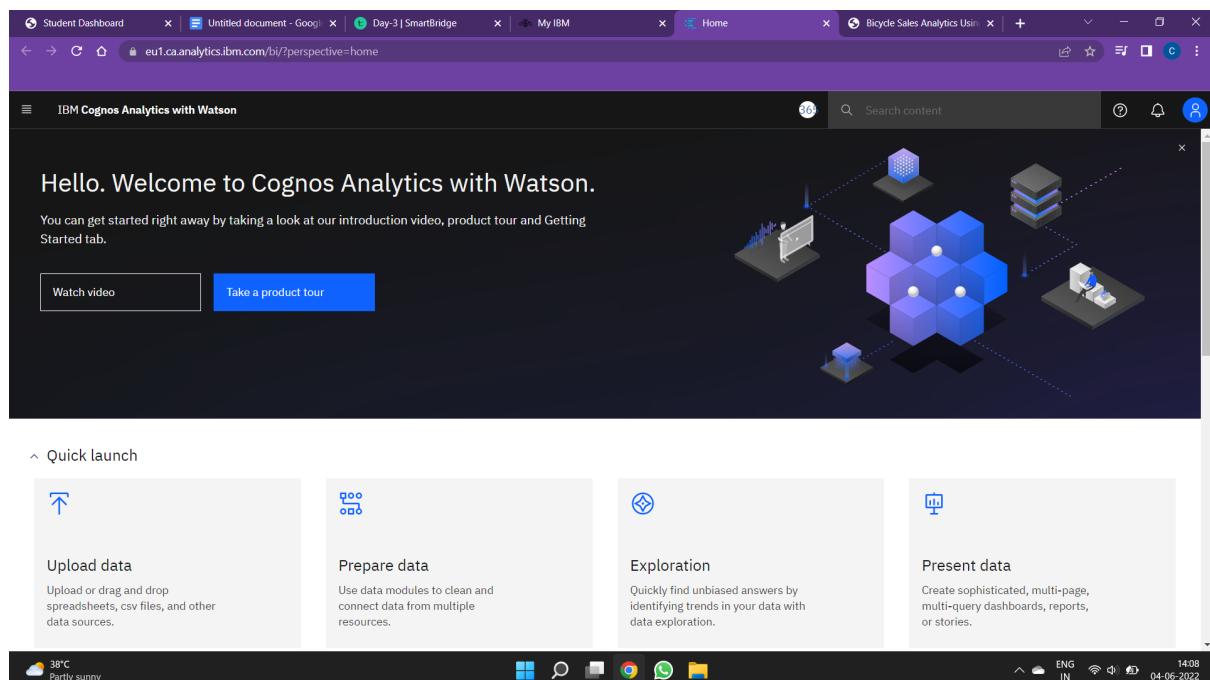
I'm utilising IBM cognos to work with the Adventure Works dataset to display possible solutions and deliver various Sales Analytics for the organization's improvement.



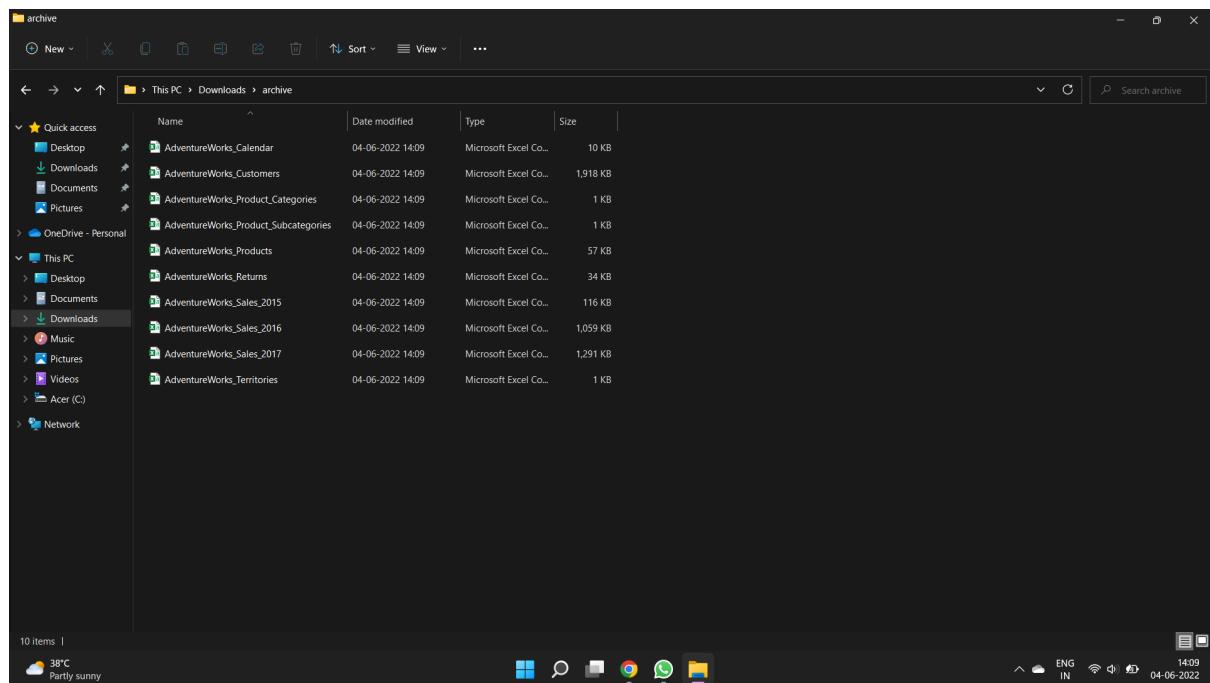
## Project Flow:

### 1. Log in to IBM Account:

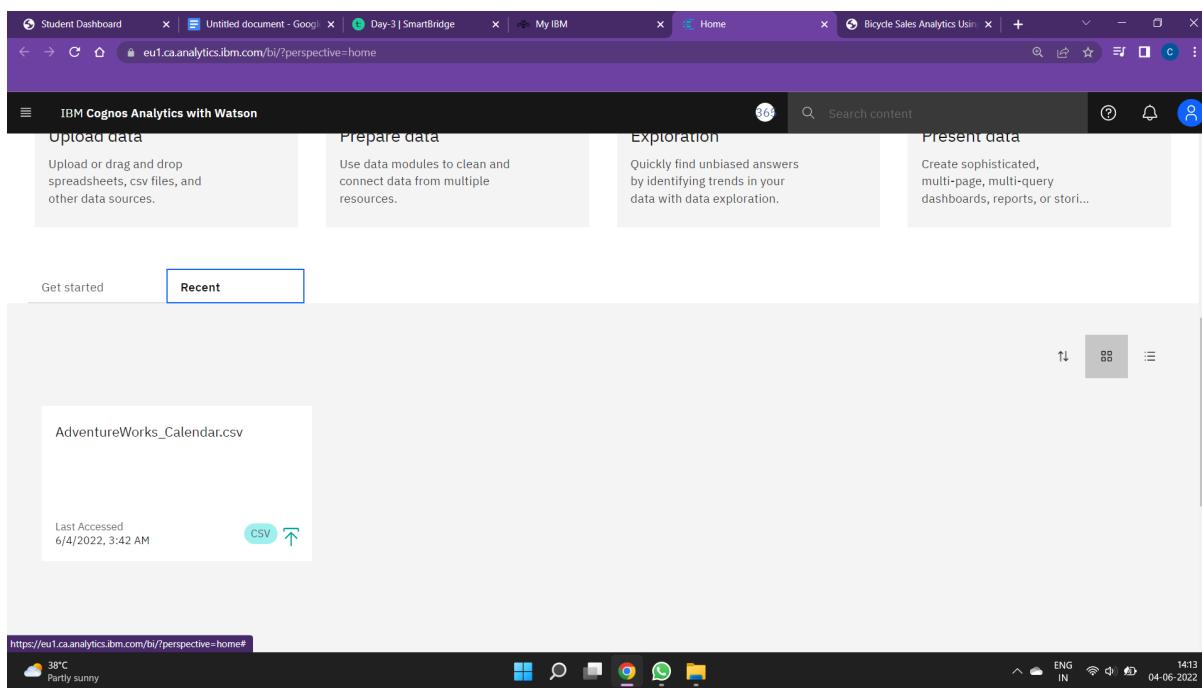
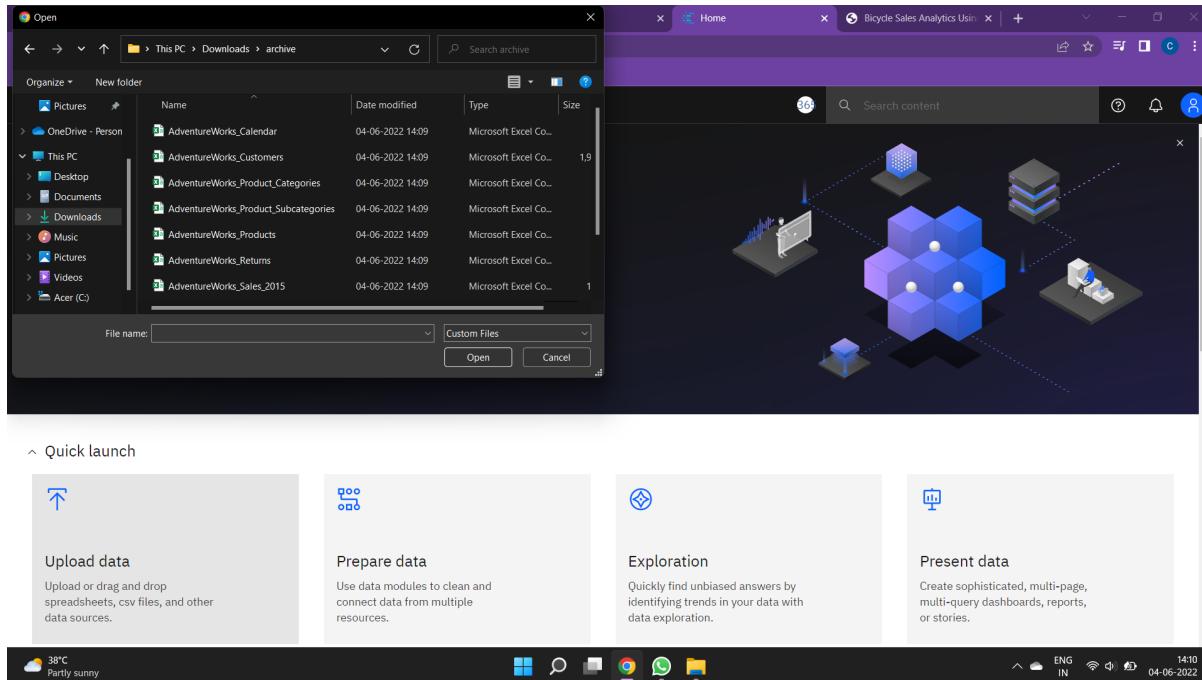
The screenshot shows the IBM MyIBM dashboard. At the top, there are several tabs: Student Dashboard, Untitled document - Google, Day-3 | SmartBridge, My IBM, Home, and Bicycle Sales Analytics Using IBM Cognos. The 'My IBM' tab is active. The main content area is titled 'Products'. It displays two trial offerings: 'Cognos Analytics on Cloud Trial for Students' (Active, Expires on Jun 4, 2023) and 'IBM Cloud' (Active, Expires on Jan 2, 2023). Both have 'Launch' and 'Manage' buttons. To the right, there is a sidebar with the text 'Let IBM provide you technology and business solutions to fit your needs' and a 'View catalog' button. At the bottom, there is a weather widget showing '38°C Partly sunny' and a system status bar with icons for battery, signal, and date/time.



## 2. Understanding the dataset:



### 3. Loading Of Dataset:



IBM Cognos Analytics with Watson

Watson.

Analyzing AdventureWorks\_Sales\_2016.csv

Cancel Details

Watch video

Take a product tour

You can get started right away by taking a look at our introduction video, product tour and Getting Started tab.

Upload data

Upload or drag and drop spreadsheets, csv files, and other data sources.

Prepare data

Use data modules to clean and connect data from multiple resources.

Exploration

Quickly find unbiased answers by identifying trends in your data with data exploration.

Present data

Create sophisticated, multi-page, multi-query dashboards, reports, or stories...

38°C  
Partly sunny

ENG IN 14:14 04-06-2022

IBM Cognos Analytics with Watson

Watson.

3 files were uploaded successfully.

Hide Details

Watch video

Take a product tour

You can get started right away by taking a look at our introduction video, product tour and Getting Started tab.

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Upload or drag and drop spreadsheets, csv files, and other data sources.

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Exploration

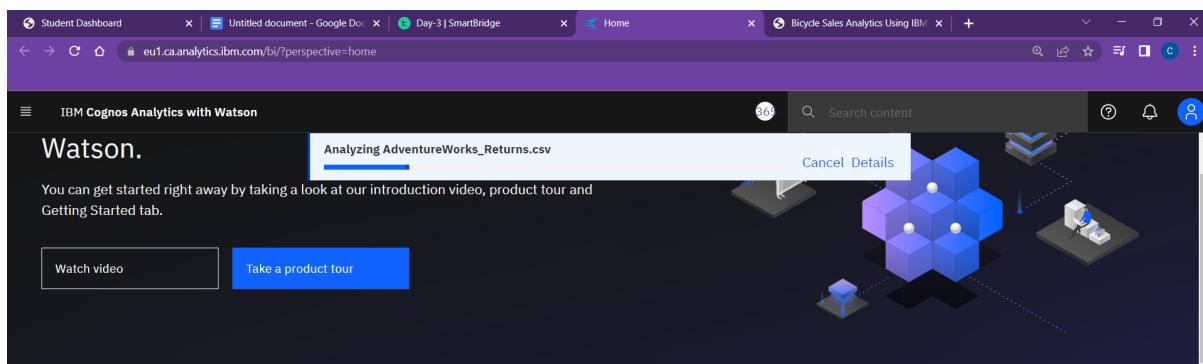
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38°C  
Partly sunny

ENG IN 14:14 04-06-2022



~ Quick launch



#### Upload data

Upload or drag and drop spreadsheets, csv files, and other data sources.



#### Prepare data

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~ Quick launch



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Create sophisticated, multi-page, multi-query dashboards, reports, or stor...



The screenshot shows the IBM Cognos Analytics with Watson interface. At the top, there are several tabs: "Student Dashboard", "Untitled document - Google Doc", "Day-3 | SmartBridge", "Home", and "Bicycle Sales Analytics Using IBM". The main area is titled "IBM Cognos Analytics with Watson" and contains a grid of eight CSV files. The files are arranged in three rows:

- Row 1:** AdventureWorks\_Territories.csv, AdventureWorks\_Customers...., AdventureWorks\_Product\_Su..., AdventureWorks\_Returns.csv.
- Row 2:** AdventureWorks\_Products.csv, AdventureWorks\_Product\_Ca..., AdventureWorks\_Sales\_2016..., AdventureWorks\_Sales\_2017...
- Row 3:** AdventureWorks\_Sales\_2015..., AdventureWorks\_Calendar.csv.

Each file entry includes the file name, last accessed date (e.g., 6/4/2022, 3:46 AM), and a "CSV" download button. The bottom of the screen shows a taskbar with icons for weather (38°C, Partly sunny), search, and various applications like File Explorer, Task View, and Edge. The system tray shows the date (04-06-2022) and time (14:16). A language indicator shows "ENG IN".

## 4. Data Preparation – Union And Joins Of The Dataset:

The screenshot shows the "Select sources" dialog in IBM Cognos Analytics. The left pane displays a list of files under "My content":

- AdventureWorks\_Calendar.csv (6/4/2022 3:42 AM)
- AdventureWorks\_Customers.csv (6/4/2022 3:45 AM)
- AdventureWorks\_Product\_Categories.csv (6/4/2022 3:45 AM)
- AdventureWorks\_Product\_Subcategories.csv (6/4/2022 3:45 AM)
- AdventureWorks\_Products.csv (6/4/2022 3:45 AM)
- AdventureWorks\_Returns.csv (6/4/2022 3:45 AM)
- AdventureWorks\_Sales\_2015.csv (6/4/2022 3:44 AM)
- AdventureWorks\_Sales\_2016.csv (6/4/2022 3:44 AM)
- AdventureWorks\_Sales\_2017.csv (6/4/2022 3:44 AM)
- AdventureWorks\_Territories.csv

The right pane contains filter options:

- Type:** Folders, Packages, Files, Data sets, Modules (none selected)
- Modified:** All (radio button selected), Today, Yesterday, Past week, Past month

The bottom of the screen shows a taskbar with icons for weather (38°C, Partly sunny), search, and various applications like File Explorer, Task View, and Edge. The system tray shows the date (04-06-2022) and time (14:16). A language indicator shows "ENG IN".

S Student Dashboard x Untitled document - Google Doc x \* New data module x Bicycle Sales Analytics Using IBM x +

eu1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=2193127561\_6ae6636e4edc4007be033b576c06e650\_sessionTemp&objRef=&tid=2193127561\_6ae6636e4edc4007be033...

IBM Cognos Analytics with Watson Learn More 165 Search content Properties

Data module +

Search New data module

Grid Relationships Custom tables

Navigation paths

- AdventureW...lendar.csv
- AdventureW...omers.csv
- AdventureW...gories.csv
- AdventureW...gories.csv
- AdventureW...oducts.csv
- AdventureW...eturns.csv
- AdventureW...\_2015.csv
- AdventureW...\_2016.csv
- AdventureW...\_2017.csv
- AdventureWo...tories.csv

Preview data

To preview data, select a table, a column in a table, or a folder that contains columns.

38°C Partly sunny ENG IN 14:21 04-06-2022

S Student Dashboard x Untitled document - Google Doc x \* New data module x Bicycle Sales Analytics Using IBM x +

eu1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=2193127561\_6ae6636e4edc4007be033b576c06e650\_sessionTemp&objRef=&tid=2193127561\_6ae6636e4edc4007be033...

IBM Cognos Analytics with Watson Learn More 165 Search content Properties

Data module +

Search

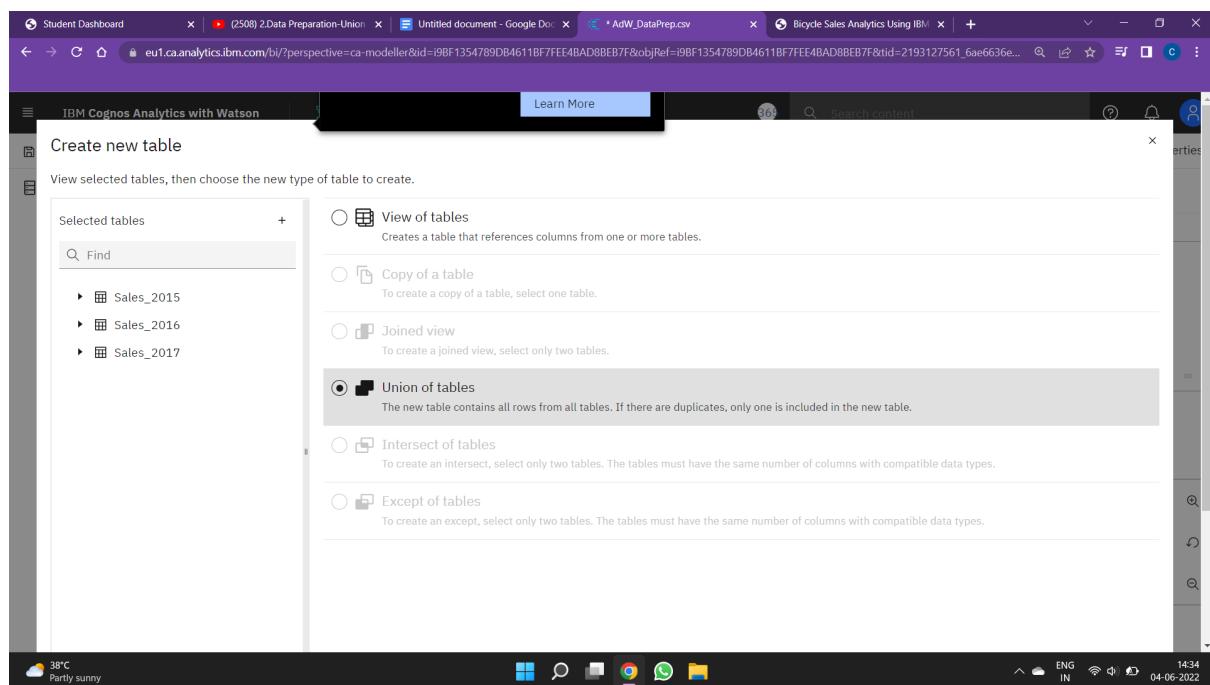
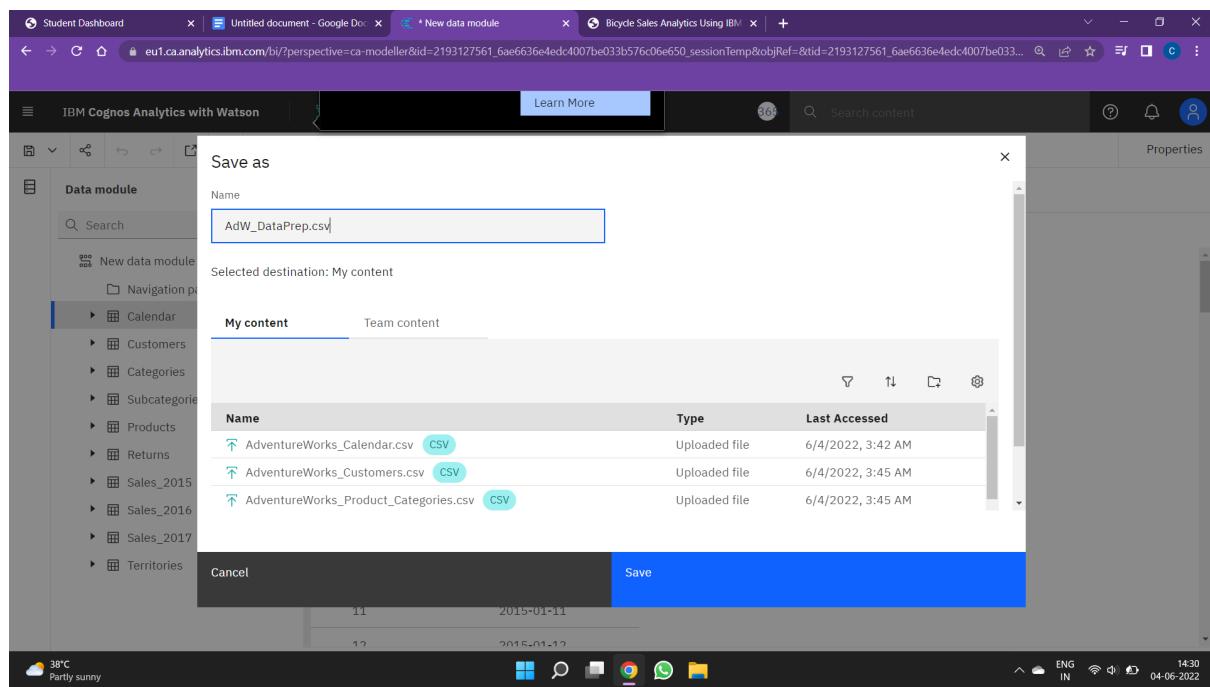
Grid Relationships Custom tables

Navigation paths

- New data module
- Navigation paths
- Calendar
- Customers
- Categories
- Subcategories
- Products
- Returns
- Sales\_2015
- Sales\_2016
- Sales\_2017
- Territories

Row Id	Date
1	2015-01-01
2	2015-01-02
3	2015-01-03
4	2015-01-04
5	2015-01-05
6	2015-01-06
7	2015-01-07
8	2015-01-08
9	2015-01-09
10	2015-01-10
11	2015-01-11
12	2015-01-12

38°C Partly sunny ENG IN 14:28 04-06-2022



Student Dashboard | (2508) 2.Data Preparation-Union | Untitled document - Google Doc | \* AdW\_DataPrep.csv | Bicycle Sales Analytics Using IBM... | +

IBM Cognos Analytics with Watson | Learn More | 165 | Search content | Properties

**Data module**

Custom tables

Sales\_data

Sales\_2017  
Sales\_2016  
Sales\_2015

AdW\_DataPrep.csv

Navigation paths

- Sales\_data
- Calendar
- Customers
- Categories
- Subcategories
- Products
- Returns
- Sales\_2015
- Sales\_2016
- Sales\_2017
- Territories

38°C Partly sunny | ENG IN 14:38 04-06-2022

Student Dashboard | (2508) 2.Data Preparation-Union | Untitled document - Google Doc | \* AdW\_DataPrep.csv | Bicycle Sales Analytics Using IBM... | +

IBM Cognos Analytics with Watson | Learn More | 165 | Search content | Properties

Create relationship

Table 1: Categories

Table 2: Subcategories

Match selected columns

Row Id	CategoryName	ProductCategoryKey	Row Id	ProductSubcategoryKey	SubcategoryName
1	Bikes	1	1	1	Mountain Bikes
1	Bikes	1	2	2	Road Bikes
1	Bikes	1	3	3	Touring Bikes
2	Components	2	4	4	Handlebars

38°C Partly sunny | ENG IN 14:38 04-06-2022

Create relationship

Table 1: Products

Table 2: Sales\_data

Relationship: 1:N

Match selected columns

	ProductDescription	ProductColor	ProductSize	ProductStyle	ProductCost	ProductPrice	ProductKey
	Value-priced bike with many features of our top-of-the-line models. Has the same light, stiff frame, and the quick acceleration we're famous for.	Black	58	U	413.1463	699.0982	332
	This bike is ridden by race winners						

38°C Partly sunny ENG IN 14:43 04-06-2022

IBM Cognos Analytics with Watson

Create relationship

Table 1: Products

Table 2: Returns

Relationship: 1:N

Match selected columns

	ProductDescription	ProductColor	ProductSize	ProductStyle	ProductCost	ProductPrice	ProductKey
	Universal fit, well-vented, lightweight , snap-on visor.	Red	0	0	13.0863	34.99	214
	Universal fit, well-vented, lightweight , snap-on visor.	Red	0	0	13.0863	34.99	214
	Universal fit, well-vented, lightweight , snap-on visor.	Red	0	0	13.0863	34.99	214

38°C Partly sunny ENG IN 14:44 04-06-2022

Student Dashboard x (2508) 2.Data Preparation-Union x Untitled document - Google Doc x \* AdW\_DataPrep.csv x Bicycle Sales Analytics Using IBM x +

eu1.ca.analytics.ibm.com/bi/?perspective=ca-modeler&id=9BF1354789DB4611BF7EE4BAD8BE7F&objRef=9BF1354789DB4611BF7EE4BAD8BE7F&tid=2193127561\_6ae6636e... Search content

IBM Cognos Analytics with Watson \* AdW\_DataPrep.csv 669 ?

### Create relationship

Table 1: Customers

Table 2: Sales\_data

Relationship: 1 -> N

Search fields:

Table 1 (Customers): Row Id, CustomerKey, Prefix, FirstName, LastName

Table 2 (Sales\_data): Row Id, OrderDate, StockDate, OrderNumber, ProductKey

Match selected columns: Match selected columns

EmailAddress	AnnualIncome	TotalChildren	EducationLevel	Occupation	HomeOwner	CustomerKey
john48@adventure-works.com	\$80,000.00	1	Partial College	Skilled Manual	N	14657
adrienne7@adventure-works.com	\$30,000.00	3	High School	Skilled Manual	Y	18906
alexandra57@adventure-works.com	\$60,000.00	1	Bachelors	Professional	N	29170
richard36@adventure-	\$80,000.00	5	Graduate Degree	Professional	N	29174

Cloud icon: 38°C Partly sunny ENG IN 14:46 04-06-2022

Student Dashboard | (2508) 2.Data Preparation-Union | Untitled document - Google Doc | AdW\_DataPrep.csv | Bicycle Sales Analytics Using IBM | +

eu1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=9BF1354789DB4611BF7FE4BAD8BE7F&objRef=9BF1354789DB4611BF7FE4BAD8BE7F&tid=2193127561.6ae6636e...

IBM Cognos Analytics with Watson \* AdW\_DataPrep.csv

Create relationship

Table 1 Territories Table 2 Sales\_data

1 N

Search

# Row Id  
# SalesTerritoryKey  
📍 Region  
📍 Country  
📍 Continent

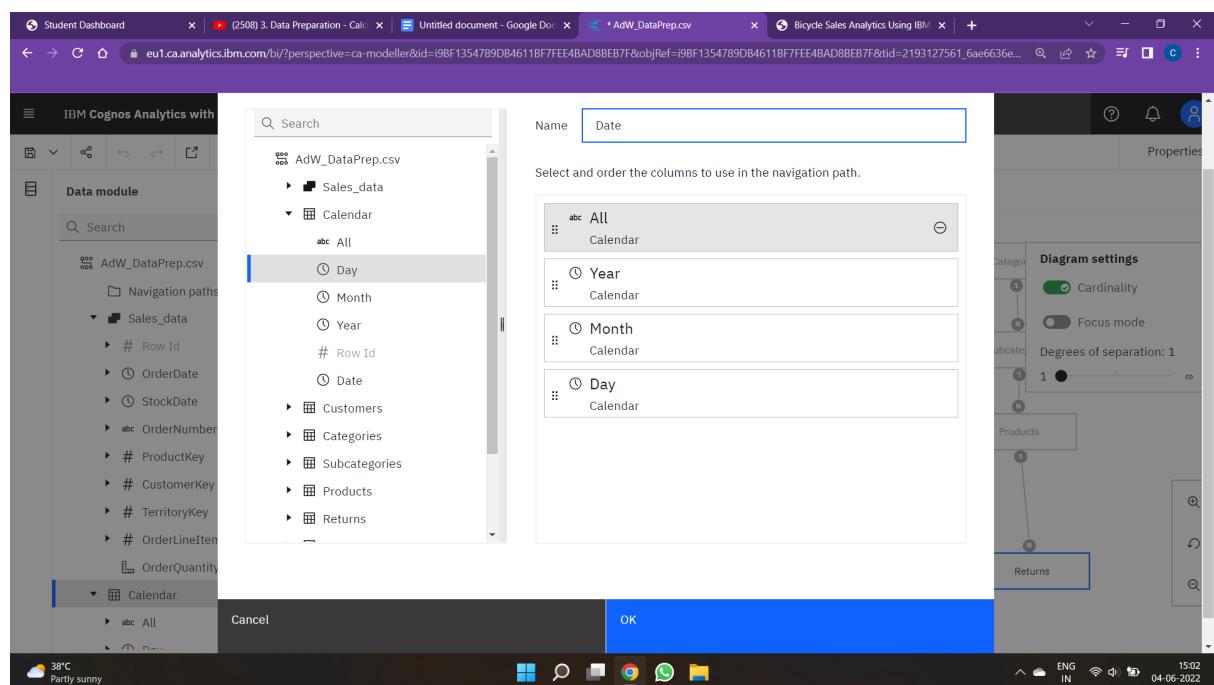
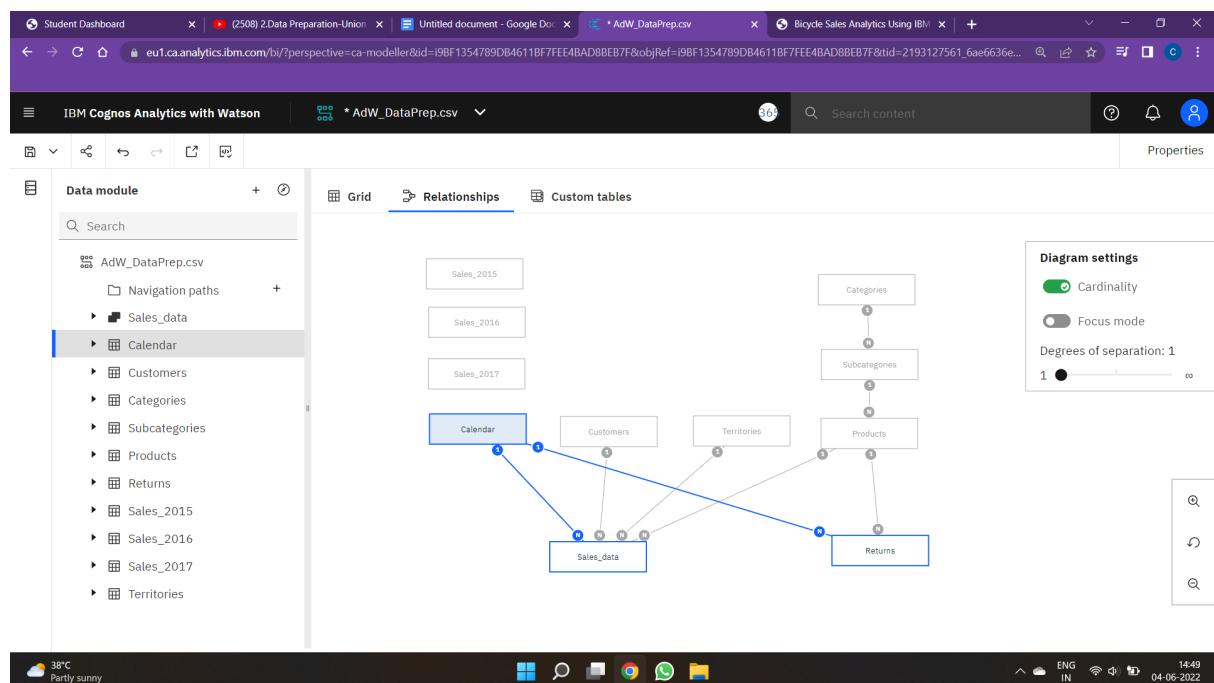
abc OrderNumber  
# ProductKey  
# CustomerKey  
# TerritoryKey  
# OrderLineItem

Match selected columns

Row Id	Region	Country	Continent	SalesTerritoryKey TerritoryKey	Row Id	OrderDate	StockDate
1	Northwest	United States	North America	1	1	2015-01-01	2001-10-01
9	Australia	Australia	Pacific	9	9	2015-01-03	2001-10-01
4	Southwest	United States	North America	4	10	2015-01-03	2001-10-01
1	Northwest	United States	North America	1	21	2015-01-04	2001-10-01

38°C Partly sunny ENG IN 14:47 04-06-2022

## 5. Data Preparations-Calculations:



## 6. Product wise Order Quantity, Return Quantity and Return Rate:

The screenshot shows the IBM Cognos Analytics with Watson interface. On the left, the 'Selected sources /' pane lists 'AdW\_DataPrep.csv' and various navigation paths like 'ReturnRate', 'Sales\_data', 'Calendar', etc. The main area, 'Tab 1', contains a 4x4 grid placeholder. To the right, there's a large cube icon and the message 'No visualization selected'. Below the interface, the Windows taskbar shows the date as 04-06-2022.

table-1

The screenshot shows the same IBM Cognos Analytics interface after a visualization has been added. The 'Tab 1' area now displays a table with columns: 'ProductName', 'OrderQuantity', 'ReturnQuantity', and 'ReturnRate'. The table contains data for various products. To the right of the table, the 'Columns\*' pane lists the four columns with their current values. A 'Local filters' section is also visible. The Windows taskbar at the bottom shows the date as 04-06-2022.

ProductName	OrderQuantity	ReturnQuantity	ReturnRate
AWC Logo Cap	4,151	46	0.01
All-Purpose Bike S...	234	8	0.03
Bike Wash - Dissol...	1,706	25	0.01
Classic Vest, L	182	4	0.02
Classic Vest, M	182	7	0.04
Classic Vest, S	157	8	0.05
Fender Set - Moun...	3,960	54	0.01
HL Mountain Tire	1,305	49	0.04
HL Road Tire	795	28	0.04

The screenshot shows the IBM Cognos Analytics with Watson interface. On the left, the 'Selected sources /' pane lists 'AdW\_DataPrep.csv' and its contents: Navigation paths, ReturnRate, Sales\_data (OrderDate, StockDate, OrderNumber, ProductKey, CustomerKey, TerritoryKey, OrderLineItem, OrderQuantity), Calendar, and Customers. The main area displays 'Tab 1' with a table titled 'ReturnRate, ReturnQuantity, OrderQuantity and ProductName'. The table has four columns: ProductName, OrderQuantity, ReturnQuantity, and ReturnRate. The data includes items like AWC Logo Cap, All-Purpose Bike, Bike Wash - Disso..., Classic Vest, L, Classic Vest, M, Classic Vest, S, Fender Set - Mou..., HL Mountain Tire, and HL Road Tire. The 'Format data' pane on the right is set to 'Percent' with 2 decimal places, checked for 'Use thousands separator' and 'Convert decimal to percentage', and specifies '<default>' for missing value characters. The system status bar at the bottom shows weather (39°C, Partly sunny), language (ENG IN), battery level (15:38), and date (04-06-2022).

ProductName	OrderQuantity	ReturnQuantity	ReturnRate
AWC Logo Cap	4,151	46	1.11%
All-Purpose Bike ...	234	8	3.42%
Bike Wash - Disso...	1,706	25	1.47%
Classic Vest, L	182	4	2.20%
Classic Vest, M	182	7	3.85%
Classic Vest, S	157	8	5.10%
Fender Set - Mou...	3,960	54	1.36%
HL Mountain Tire	1,305	49	3.75%
HL Road Tire	795	28	3.52%

table-1

This screenshot shows the same interface as above, but with a 'Columns\*' pane open on the right. The 'Top or bottom' section is selected, with 'Number of results (1 - 100)' set to 12, 'Show' set to 'Top count' (radio button selected), and 'By' set to 'ReturnRate'. The table data remains the same as in the first screenshot.

ProductName	OrderQuantity	ReturnQuantity	ReturnRate
Road-650 Red, 52	51	6	11.76%
Mountain-100 Silv...	24	2	8.33%
Touring-2000 Blue...	96	8	8.33%
Mountain-500 Bla...	41	3	7.32%
Mountain-100 Bla...	31	2	6.45%
Mountain-100 Bla...	36	2	5.56%
Touring-3000 Blue...	54	3	5.56%
Road-650 Red, 48	75	4	5.33%
Mountain-500 Silv...	38	2	5.26%

**Tab 1**

ProductName	OrderQuantity	ReturnQuantity	ReturnRate
Mountain-100 Silver, 44	24	2	8.33%
Touring-2000 Blue, 46	96	8	8.33%
Mountain-500 Black, 52	41	3	7.32%
Mountain-100 Black, 44	31	2	6.45%
Mountain-100 Black, 48	36	2	5.56%
Touring-3000 Blue, 54	54	3	5.56%
Road-650 Red, 48	75	4	5.33%
Mountain-500 Silver, 44	38	2	5.26%
Road-650 Red, 60	39	2	5.13%
Classic Vest, S	157	8	5.10%
Women's Mountain Shorts, L	334	17	5.09%
Touring-3000 Yellow, 44	59	3	5.08%
Road-150 Red, 44	139	7	5.04%
<b>Summary</b>	1,174	69	6.05%

table-1

**Create calculation**

Name: Revenue

Components:

- ProductSKU
- ProductName
- ModelName
- Product...ption
- ProductColor
- ProductSize
- ProductStyle
- ProductCost
- ProductPrice**
- Returns
- Sales\_2015
- Sales\_2016

Expression:

```
1 Sales_2015_Union_1.OrderQuantity * AdventureWorks_Products_csv.ProductPrice
```

Validation Results:

The expression is valid.

Student Dashboard   (2509) 4.Text Tables - YouTube   Untitled document - Google Doc   \* New dashboard   Bicycle Sales Analytics Using IBM ...

### IBM Cognos Analytics with Watson

**Selected sources /**

**AdW\_DataPrep.csv**

Search

- Navigation paths
- Revenue
- ReturnRate
- Sales\_data
  - OrderDate
  - StockDate
  - OrderNumber
  - ProductKey
  - CustomerKey
  - TerritoryKey
  - OrderLineItem
  - OrderQuantity
  - Calendar

**Tab 1**

**Top 12 products by Returns**

ProductName	OrderQuantity	ReturnQuantity	ReturnRate
Road-650 Red...	51	6	11.76%
Mountain-100 ...	24	2	8.33%
Touring-2000 ...	96	8	8.33%
Mountain-500 ...	41	3	7.32%
Mountain-100 ...	31	2	6.45%
Mountain-100 ...	36	2	5.56%
Touring-3000 ...	54	3	5.56%
Road-650 Red...	75	4	5.33%
Mountain-500 ...	38	2	5.26%
Road-650 Red...	39	2	5.13%
Classic Vest, S	157	8	5.10%
Women's Mou...	334	17	5.09%
Touring-3000 ...	59	3	5.08%

**OrderQuantity and ProductName**

ProductName	OrderQuantity
Water Bottle - 30 oz.	7,967
Patch Kit/8 Patches	5,898
Mountain Tire Tube	5,678

**Revenue and ProductName**

ProductName	Revenue
Mountain-200 Black, 46	1,241,753.51
Mountain-200 Black, 42	1,233,557.12
Mountain-200 Silver, 38	1,213,851.89
Mountain-200 Silver, 46	1,182,780.59
Mountain-200 Black, 38	1,165,936.88
<b>Summary</b>	6,038,250.51

39°C Partly sunny   ENG IN 15:51 04-06-2022

table-1

Student Dashboard   (2509) 5.Tree Map - YouTube   Untitled document - Google Doc   \* New dashboard   Bicycle Sales Analytics Using IBM ...

### IBM Cognos Analytics with Watson

**Selected sources /**

**AdW\_DataPrep.csv**

Search

- Navigation paths
- Revenue
- ReturnRate
- Sales\_data
  - OrderDate
  - StockDate
  - OrderNumber
  - ProductKey
  - CustomerKey
  - TerritoryKey
  - OrderLineItem
  - OrderQuantity
  - Calendar

**Tab 1   Tab 2**

**Revenue for EducationLevel hierarchy**

Revenue (Calculated)

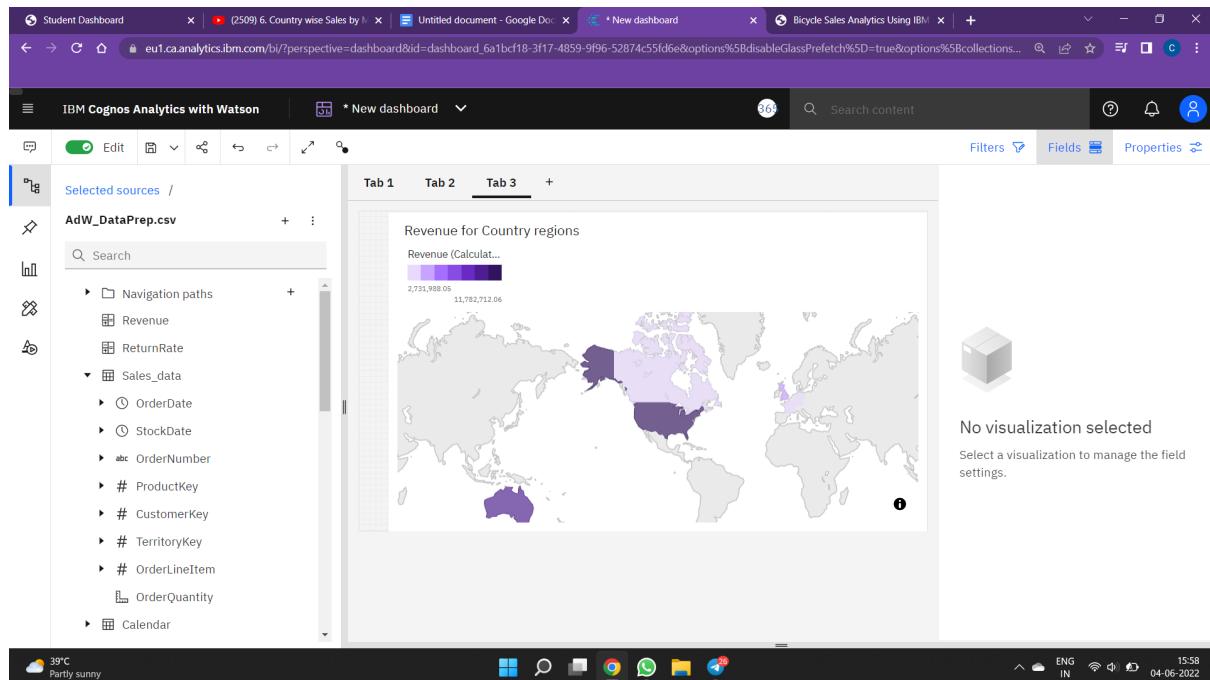
EducationLevel

- Bachelor
- Partial College
- Graduate Degree
- High School
- Partial High School

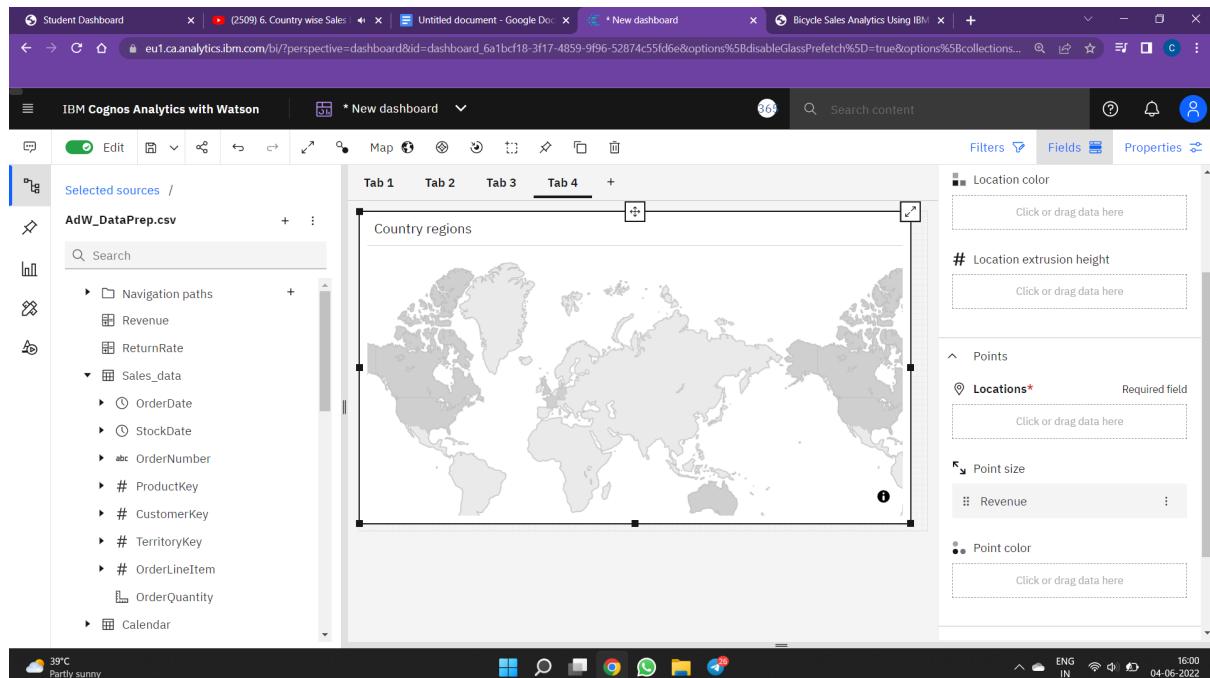
No visualization selected  
Select a visualization to manage the field settings.

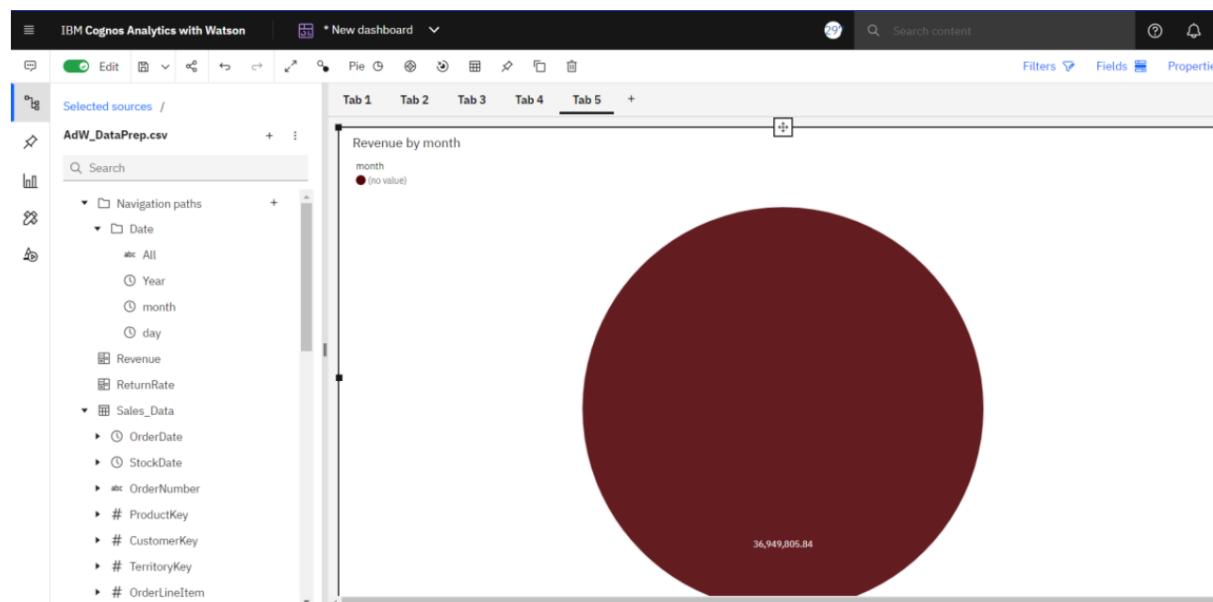
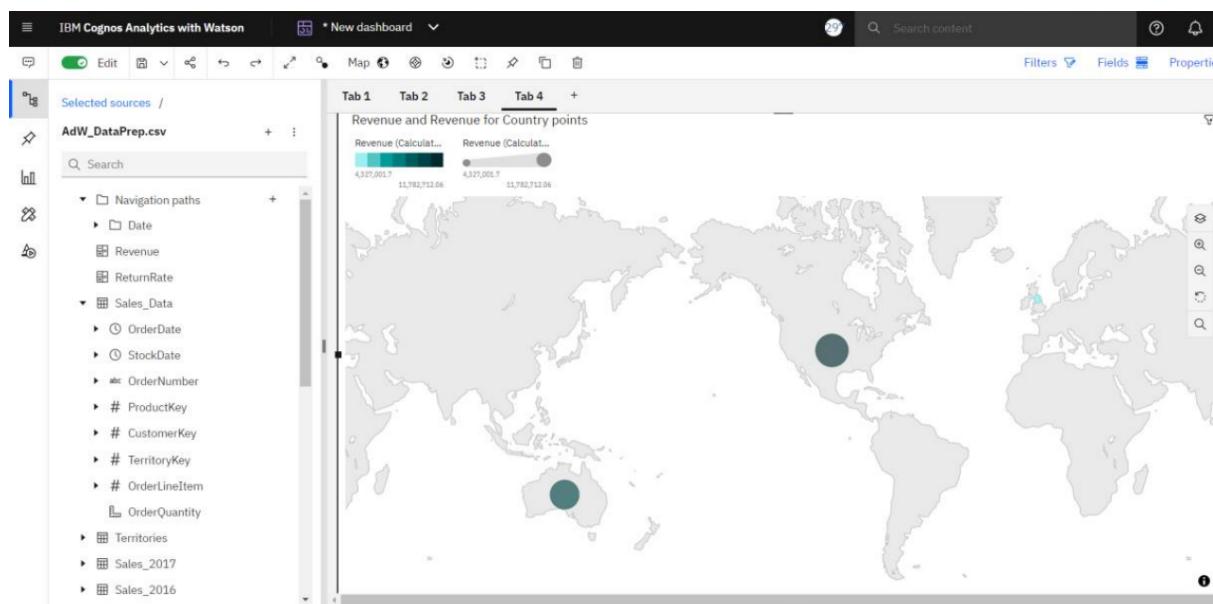
39°C Partly sunny   ENG IN 15:54 04-06-2022

Table -2

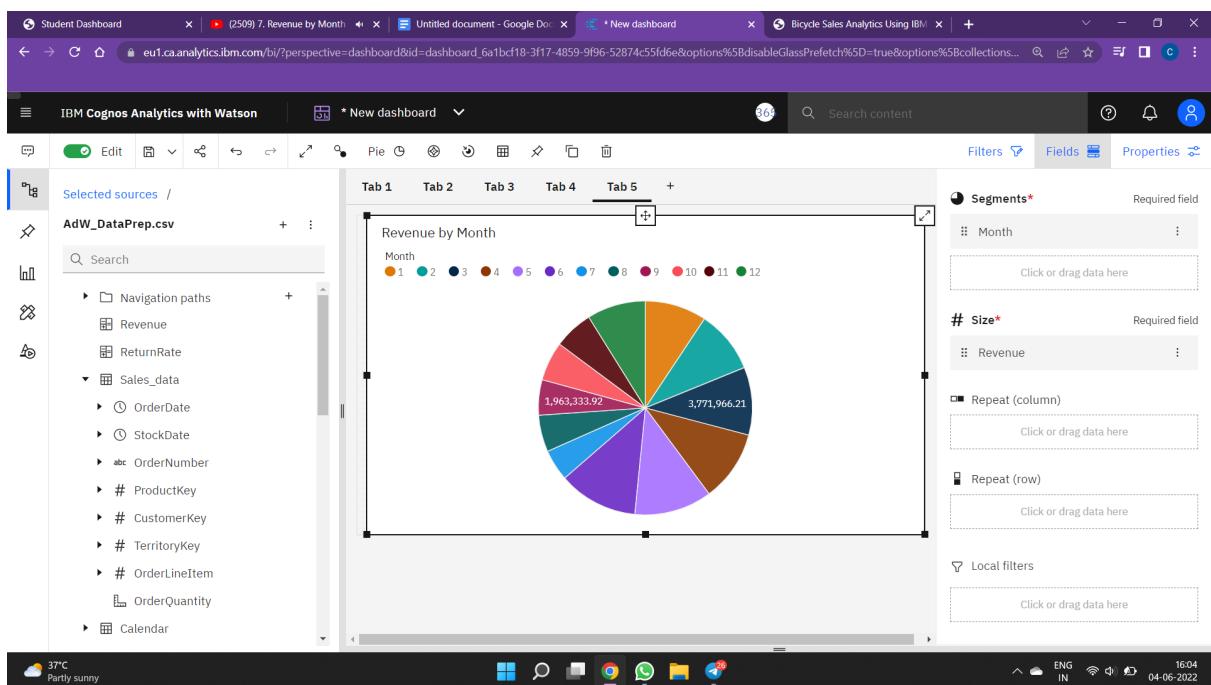


map

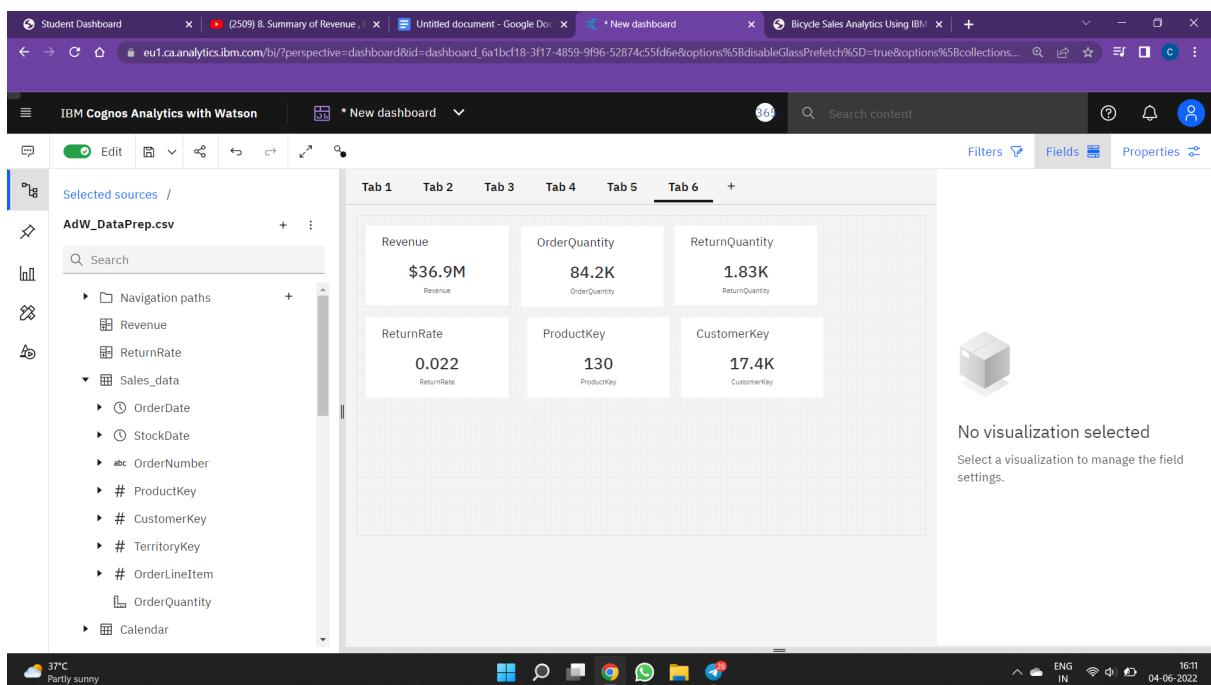




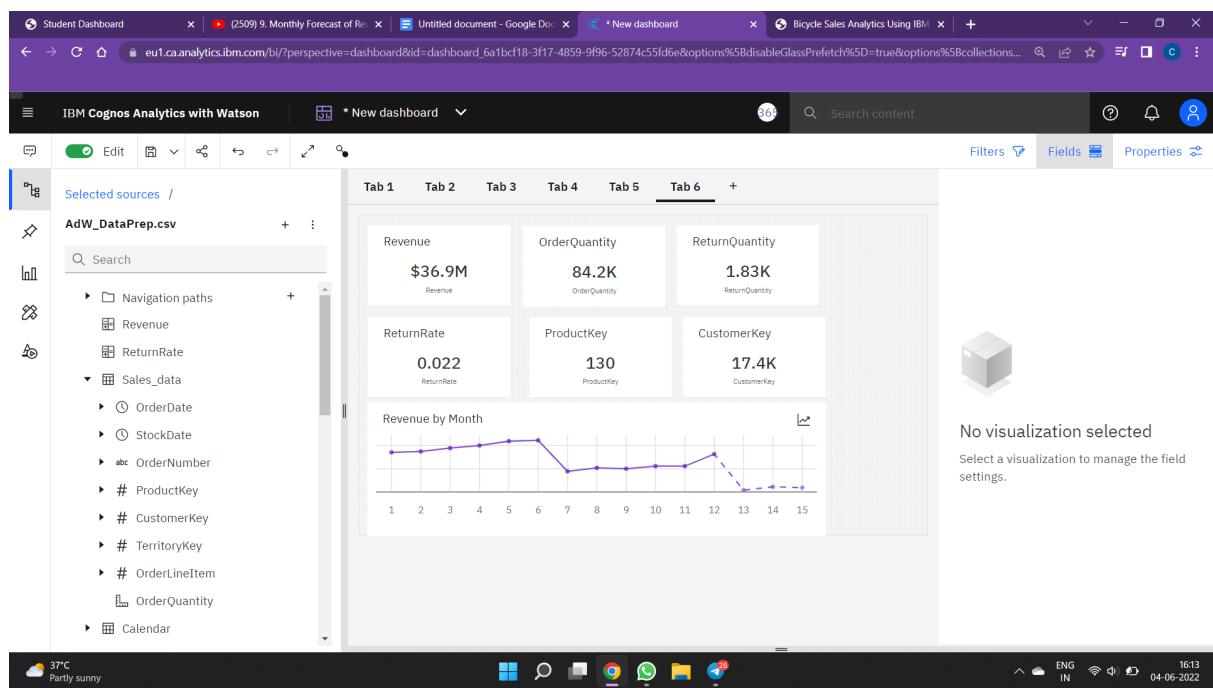
Based on point colours



## Pie chart



## summary



With graph

## **Advantage and Disadvantage of creating Dashboard:**

### **Advantage:**

- 1) Dashboards give firms more visibility and make data available whenever they're needed, allowing them to respond more quickly to changing market conditions.
- 2) We no longer waste time generating reports from numerous systems thanks to dashboards. Instead, data is extracted from a source and presented as a simple visual overview.
- 3) Future demand can be more precisely predicted utilising historical data with better insight into the data. For increased success, businesses can better plan for demand changes by creating measurable targets and deliverables.
- 4) A dashboard allows firms to analyse vital data quickly and thoroughly, whether they're providing reporting and analysis for the entire organisation or certain functional areas of the business. Visualized interactivity helps to convey large volumes of data in a simple and understandable manner. Better business decisions can be made with the capacity to quickly discern what the data really means.

## **Disadvantage:**

- 1) Users attempting to incorporate too much information without comprehending restrictions or evaluating their individual demands from the spectrum of different measurables detailed data analysis provides, resulting in a flashy or cluttered design.
- 2) The technology used to create dashboards is different from other software solutions already in use in organisations, and it can be difficult to grasp at first.
- 3) The use of dashboard metrics in the company is not governed by any established norms or hierarchy. This means that each person can interpret the measurements in their own unique way, resulting in a wide range of data being reported.

## **Conclusion:**

We can understand supplied data using diagrams, graphs, and maps in this way. This knowledge of data enables us to ask the proper questions in order to achieve our objectives through method optimization. We learned how to upload and prepare data with this assignment. We also covered statistical ideas that aided in the computation and presentation of graphs and maps for the dashboard.