

Bicycle Sales Analytics Using IBM Cognos

**A Project Report
Data Analytics**

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Link to Video:

Introduction

Overview

Adventure Works is a demo and training database produced for each version of Microsoft SQL Server. "Adventure Works" is a hypothetical major global bicycle manufacturing firm. The firm makes and distributes metal and composite bicycles to commercial customers in North America, Europe, and Asia. While its headquarters are in Washington, with 290 people, various regional sales teams are spread around its market base. Adventure Works Cycles purchased a modest manufacturing business in Mexico in 2000. This facility produces a number of important subcomponents for the Adventure Works Cycles product range. They took over as the sole producer and distributor of the touring bicycle product line in 2001. Following a successful fiscal year, Adventure Works Cycles plans to expand its market share by targeting sales to their best consumers, increasing product availability through an external Web site, and lowering its cost of sales through lower production expenses."

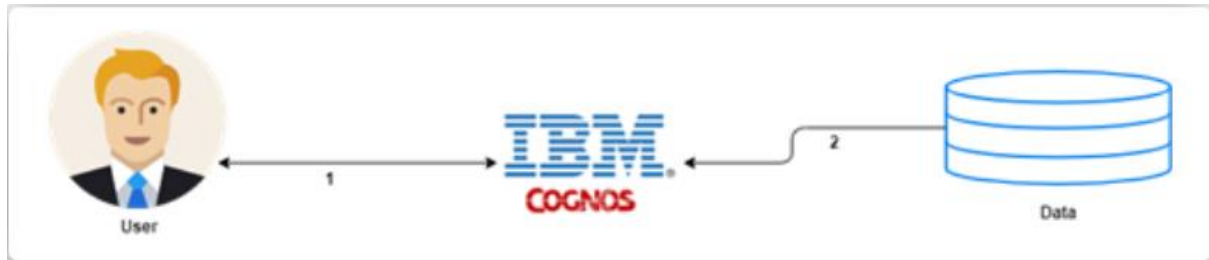
Goal

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 am using IBM cognos to work with the dataset of Adventure Works to visualize the feasible solutions and provide various Sales Analytics For the Improvement of the Organization.

Project Flow:

1. Log in to IBM Account

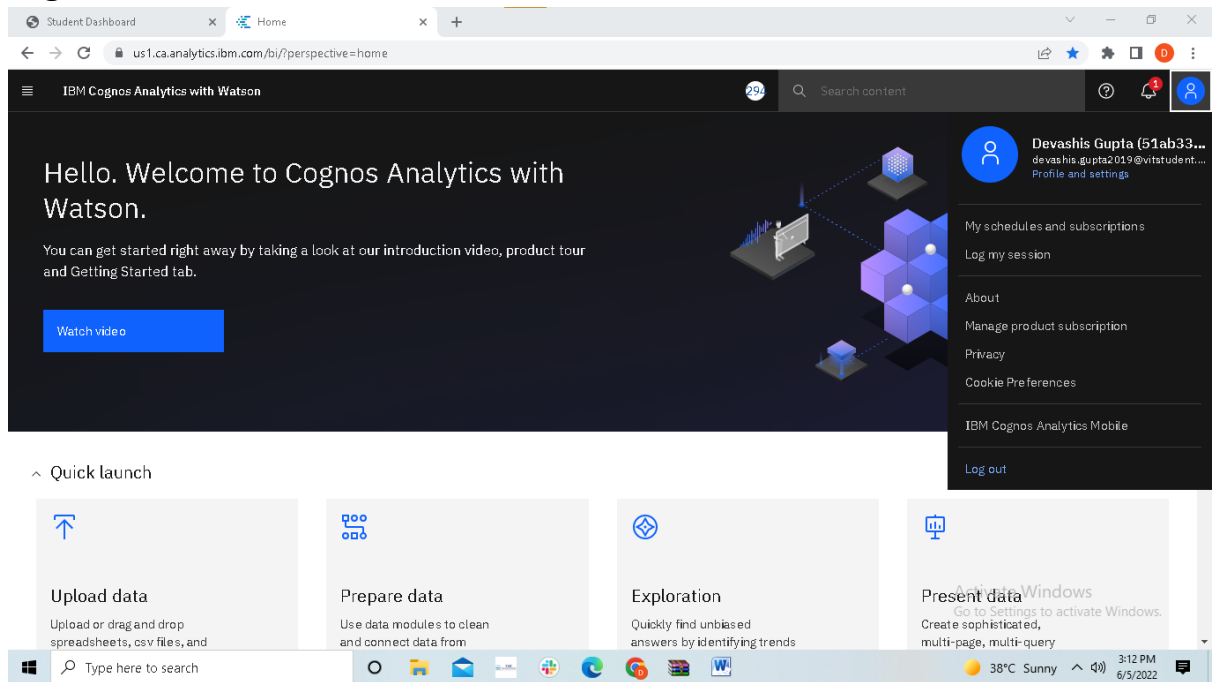


Fig: logging in to IBM account

2. Understanding the dataset

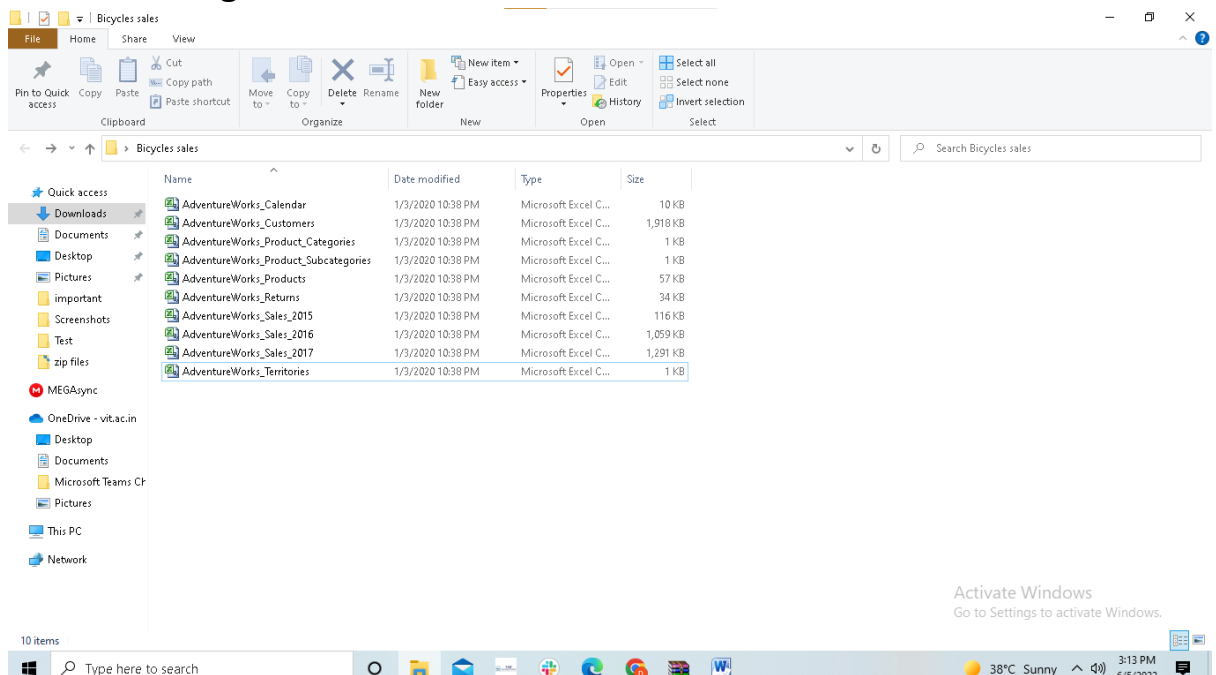


Fig: downloading and understanding the dataset

3. Loading Of Dataset

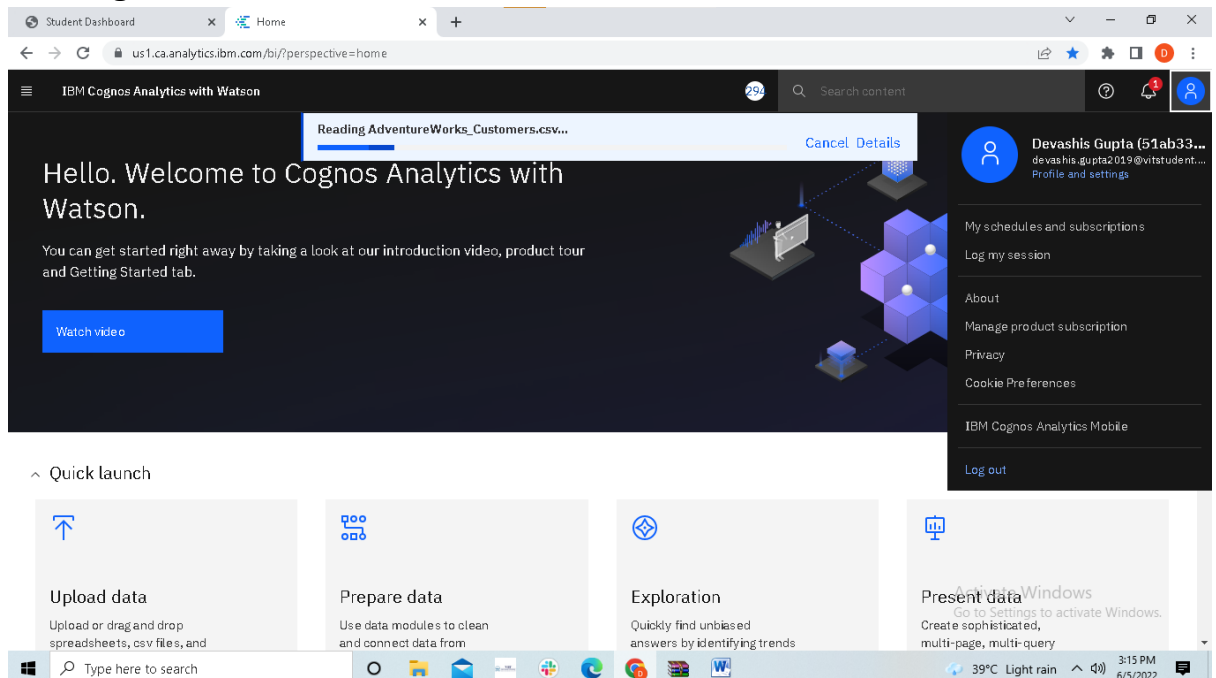


Fig: Uploading all datasets

4. Data Preparation – Union And Joins Of The Dataset

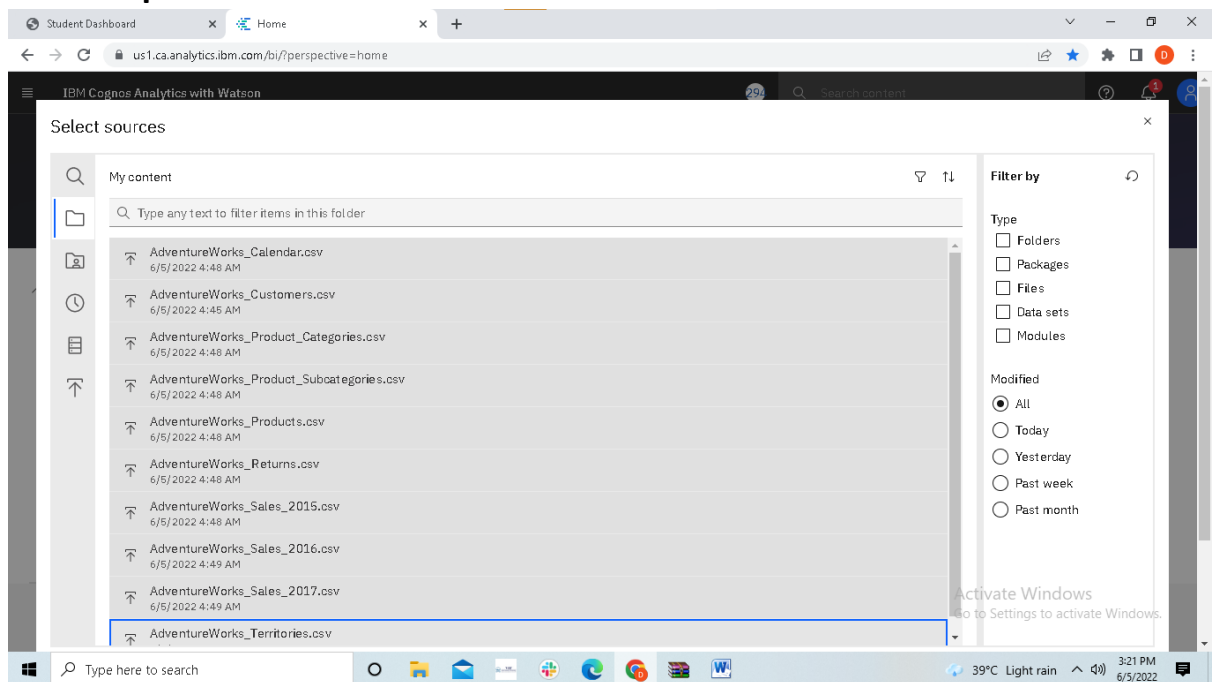


Fig: Preparation of data

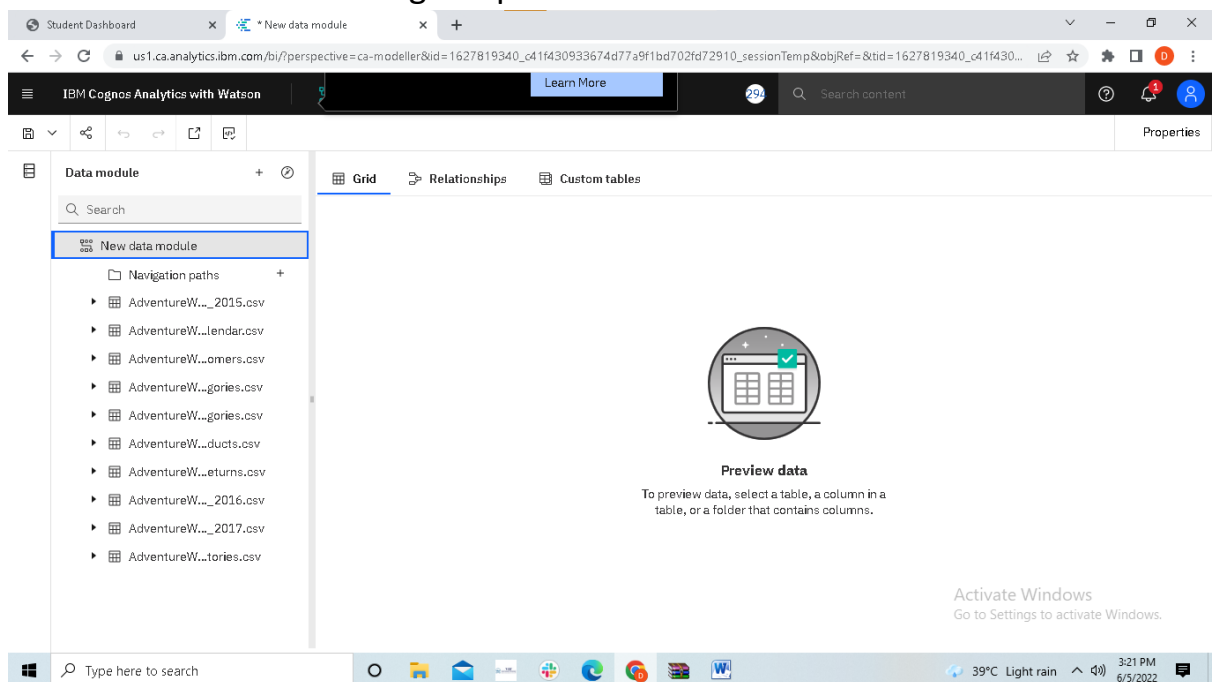


Fig: loading all dataset in the workbench

The screenshot shows the IBM Cognos Analytics interface. On the left, the 'Data module' pane lists various datasets: Sales_2015, Calendar, Customers, Product_Categories, Product_Subcategories, Products, Returns, Sales_2016, Sales_2017, and Territories. The 'Territories' dataset is selected. The main area displays a table with the following data:

Row Id	SalesTerritoryKey	Region	Country
1	1	Northwest	United States
2	2	Northeast	United States
3	3	Central	United States
4	4	Southwest	United States
5	5	Southeast	United States
6	6	Canada	Canada
7	7	France	France
8	8	Germany	Germany
9	9	Australia	Australia
10	10	United Kingdom	United Kingdom

On the right, a user profile for Devashis Gupta is visible, along with navigation links for schedules, subscriptions, and session management.

Fig: preparation of data by renaming all the datasets.

The screenshot shows the 'Save as' dialog box in the IBM Cognos Analytics interface. The 'Name' field is set to 'AdW_DataPrep.csv'. The 'Selected destination' is 'My content'. The dialog displays a list of existing files in the 'My content' space:

Name	Type	Last Accessed
AdventureWorks_Calendar.csv	Uploaded file	6/5/2022, 4:48 AM
AdventureWorks_Customers.csv	Uploaded file	6/5/2022, 4:45 AM
AdventureWorks_Product_Categories.csv	Uploaded file	6/5/2022, 4:48 AM

The dialog has 'Cancel' and 'Save' buttons at the bottom.

Fig: Saving the module after performing data preparation

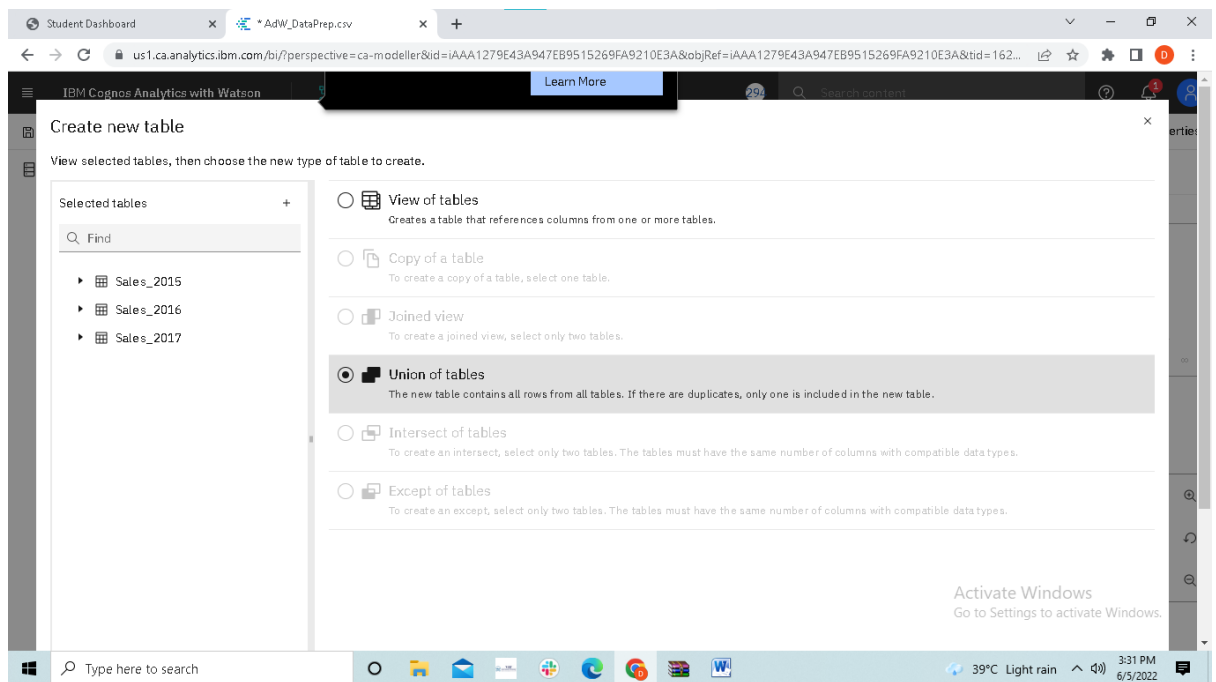


Fig: Create union of sales datasets

Create a union of tables

New table name: Sales_Data

Select items

- Find
- Sales_2015
- Row Id
- OrderDate
- StockDate
- OrderNumber
- ProductKey
- CustomerKey
- TerritoryKey
- OrderLineItem
- OrderQuantity

Row Id	OrderDate	StockDate	OrderNumber	ProductKey	CustomerKey
1	2015-01-01	2001-09-21	SO45080	332	1465
9	2015-01-03	2001-10-03	SO45093	312	1890
10	2015-01-03	2001-09-29	SO45090	310	2917
21	2015-01-04	2001-12-20	SO45099	312	2917
23	2015-01-05	2001-11-21	SO45100	326	1942
26	2015-01-06	2001-10-01	SO45108	310	2297
31	2015-01-07	2001-11-05	SO45109	311	1493
33	2015-01-07	2001-11-09	SO45111	326	2571
35	2015-01-08	2001-12-14	SO45119	314	1874
37	2015-01-08	2001-11-24	SO45116	311	2920
41	2015-01-08	2001-11-11	SO45113	313	2914
50	2015-01-10	2001-12-26	SO45126	311	1245

Activate Windows
Go to Settings to activate Windows.

Fig: After performing union dataset on sales datasets

The screenshot shows the IBM Cognos Analytics interface. On the left, the 'Data module' pane lists various data sources, including 'AdW_DataPrep.csv' and its navigation paths. The 'Sales_Data' model is selected, showing three tables: 'Sales_2015', 'Sales_2016', and 'Sales_2017'. These tables are connected to a central 'Sales_Data' table, indicating a union of sales data across different years.

Fig: Union of sales dataset

The screenshot shows the 'Create relationship' dialog in IBM Cognos Analytics. It displays two tables: 'Table 1: Categories' and 'Table 2: Subcategories'. The 'Categories' table has columns: Row Id, ProductCategoryKey, and CategoryName. The 'Subcategories' table has columns: Row Id, ProductSubcategoryKey, SubcategoryName, and ProductCategoryKey. A relationship is being established between 'ProductCategoryKey' in Table 1 and 'ProductCategoryKey' in Table 2. Below the dialog, a table shows the resulting joined data.

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
2	Components	2	5	5	Bottom Brackets

Fig: create relationship between categories and sub-categories and do a join operation.

Table 1: Subcategories

Row Id	SubcategoryName	ProductCategoryKey	ProductSubcategoryKey
31	Helmets	4	31
31	Helmets	4	31

Table 2: Products

Row Id	ProductKey	ProductSKU	ProductName
1	214	HL-U509-R	Sport
2	215	HL-U509-R	Sport Black

Row Id	SubcategoryName	ProductCategoryKey	ProductSubcategoryKey	Row Id	ProductKey	ProductSKU	ProductName
31	Helmets	4	31	1	214	HL-U509-R	Sport
31	Helmets	4	31	2	215	HL-U509-R	Sport Black

Fig: again, create relationship between subcategories and products and do join operation.

Table 1: Products

ProductKey	ProductDescription	ProductColor	ProductSize	ProductStyle	ProductCost	ProductPrice
332	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. This bike is ridden by race winners.	Black	58	U	413.1463	699.0982

Table 2: Sales_Data

ProductKey	CustomerKey	TerritoryKey
332		

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. This bike is ridden by race winners.	Black	58	U	413.1463	699.0982	332

Fig: create relationship between products and sales_data and do join operation.

Student Dashboard x * AdW_DataPrep.csv x +

us1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=iAAA1279E43A947EB9515269FA9210E3A&objRef=iAAA1279E43A947EB9515269FA9210E3A&tid=162...

Create relationship

Table 1

Products

Search

- # Row Id
- # ProductKey
- # ProductSubcategoryKey
- abc ProductSKU
- abc ProductName

Table 2

Returns

Search

- # Row Id
- ReturnDate
- # TerritoryKey
- # ProductKey

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

Activate Windows
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Type here to search

39°C Light rain 3:39 PM 6/5/2022

Fig: create relationship between products and returns and do join operations

Student Dashboard x * AdW_DataPrep.csv x +

us1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=iAAA1279E43A947EB9515269FA9210E3A&objRef=iAAA1279E43A947EB9515269FA9210E3A&tid=162...

Create relationship

Table 1

Customers

Search

- # Row Id
- # CustomerKey
- abc Prefix
- abc FirstName
- abc LastName

Table 2

Sales_Data

Search

- OrderNumber
- # ProductKey
- # CustomerKey
- # TerritoryKey

Match selected columns

	EmailAddress	AnnualIncome	TotalChildren	EducationLevel	Occupation	Home Owner	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-works.com	\$80,000.00	5	Graduate Degree	Professional	N	29174

Activate Windows
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Fig: join operation between customers and sales_data

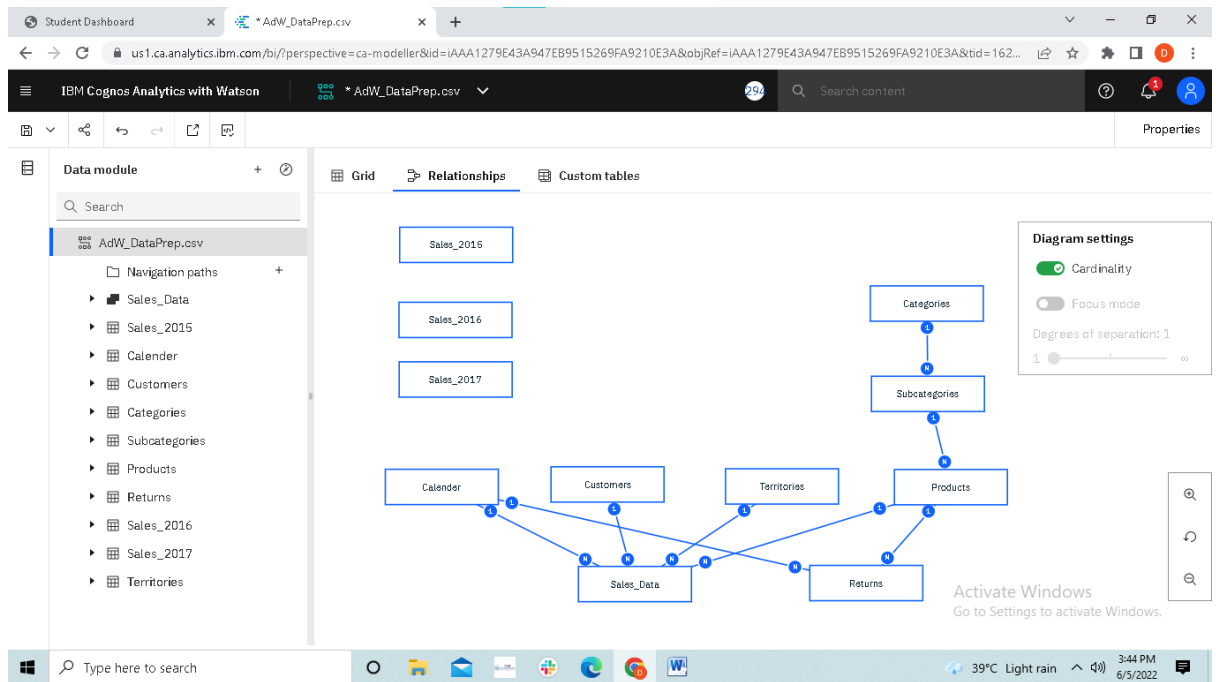


Fig: Relationship established after performing union and join operation

5. Data Preparations-Calculations

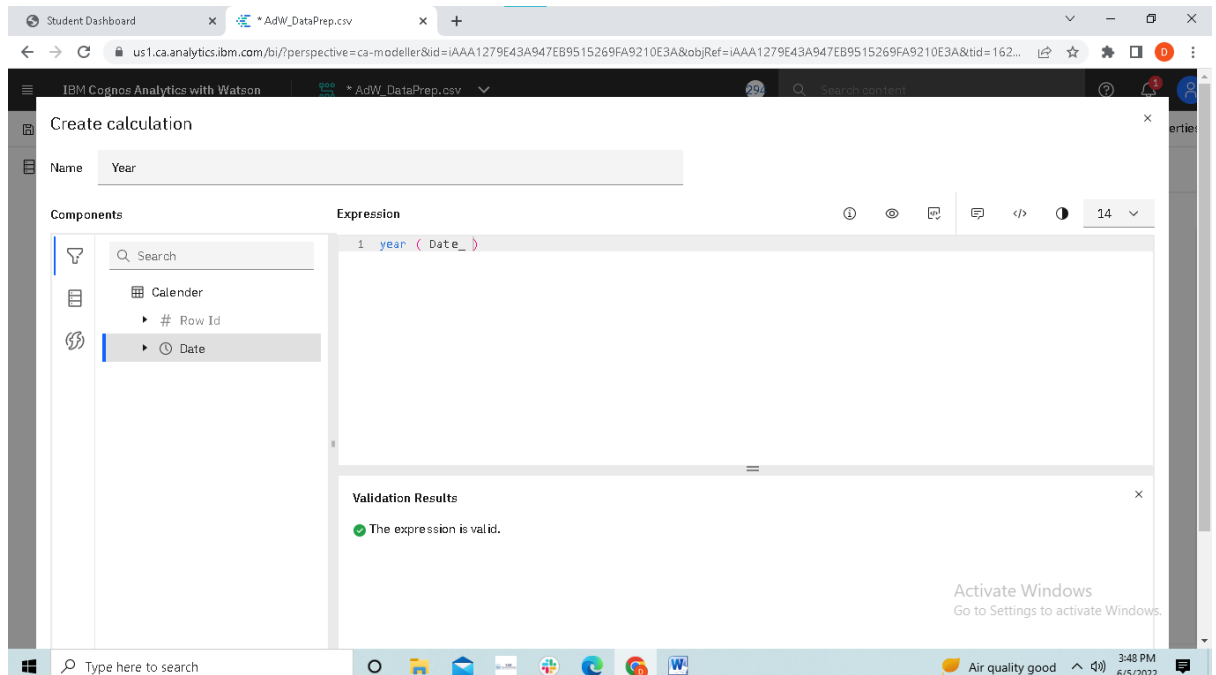


Fig: Performing Year calculation on calendar

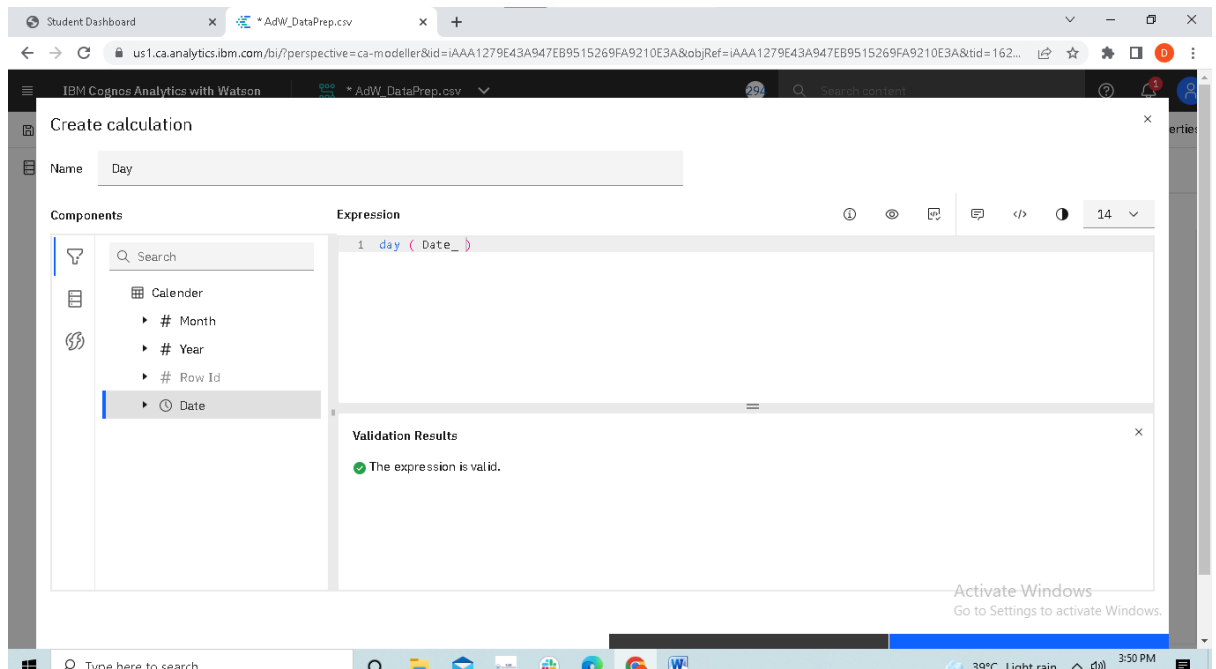


Fig: create calculation for month and date of calendar

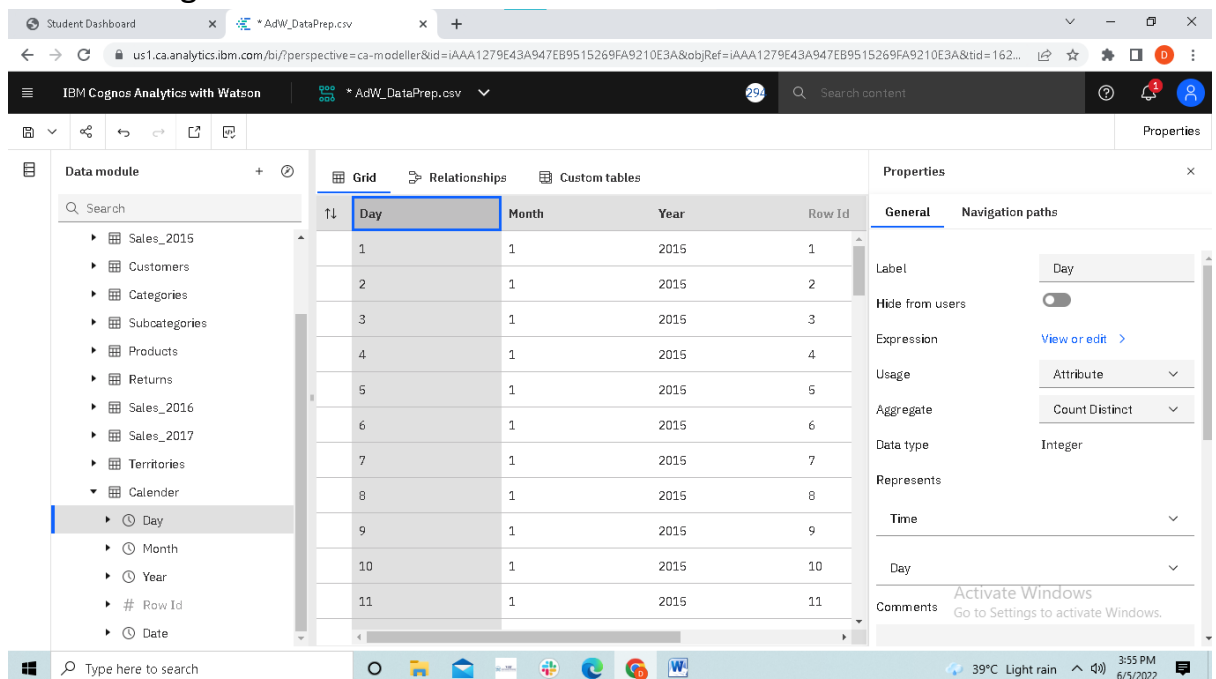


Fig: format the calculated data and update the properties

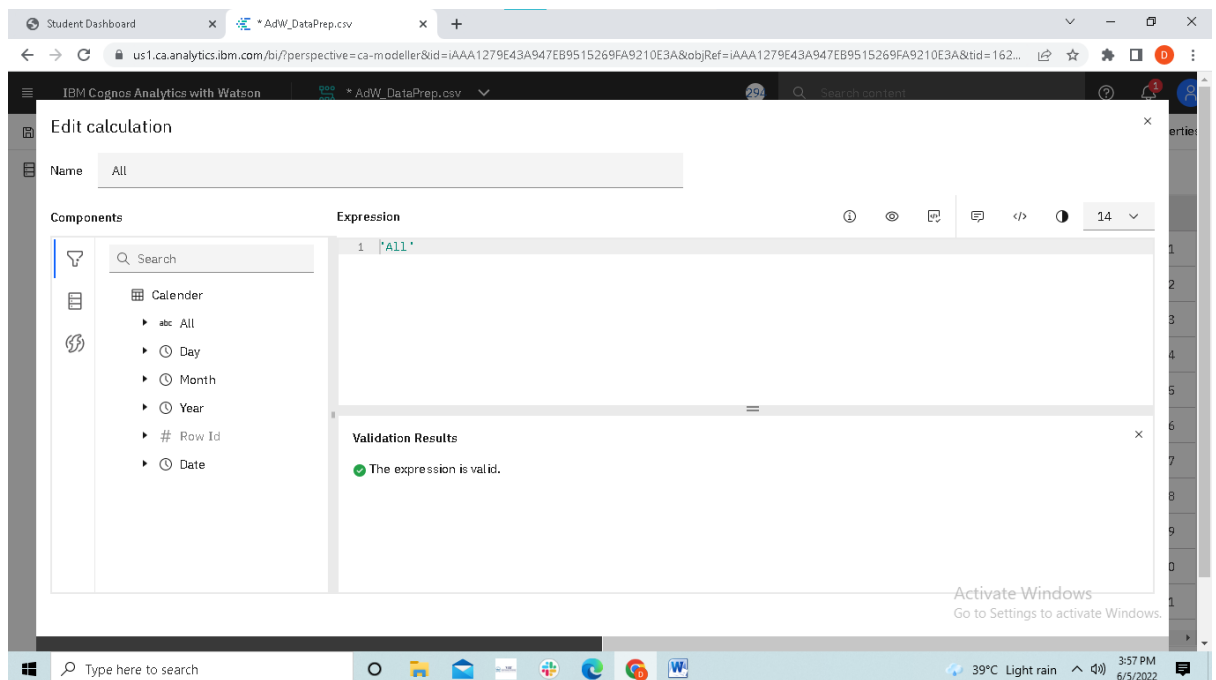


Fig: create calculation for all

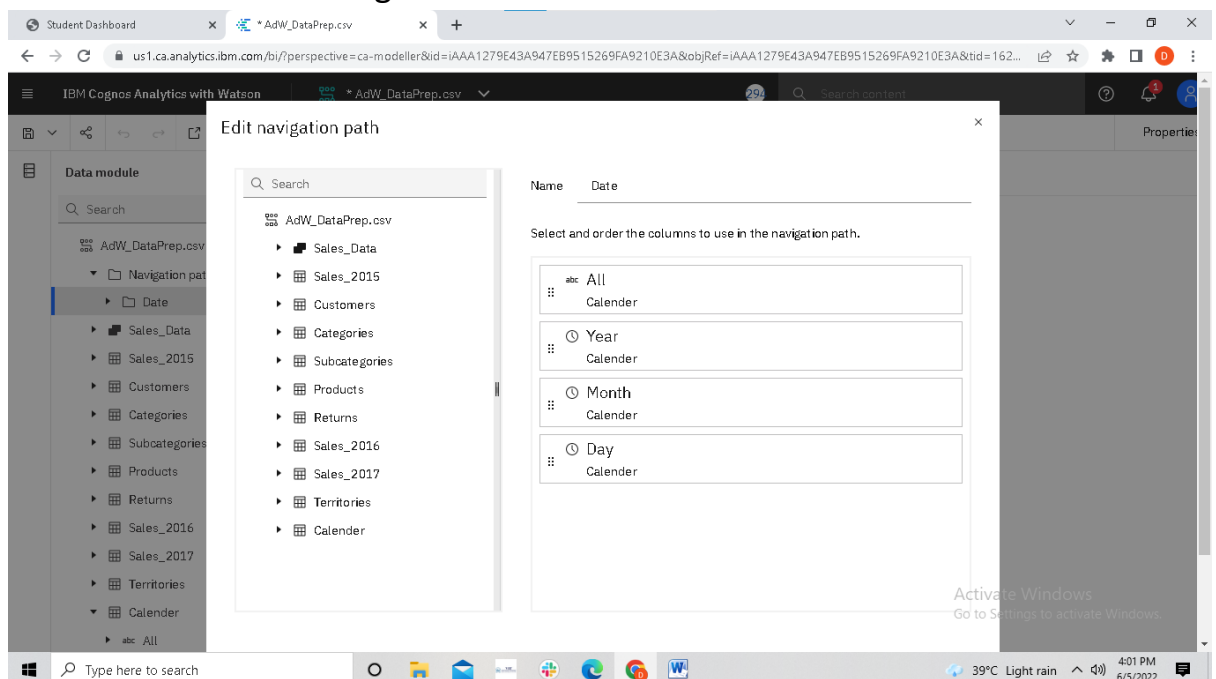


Fig: create navigation path for calendar data

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

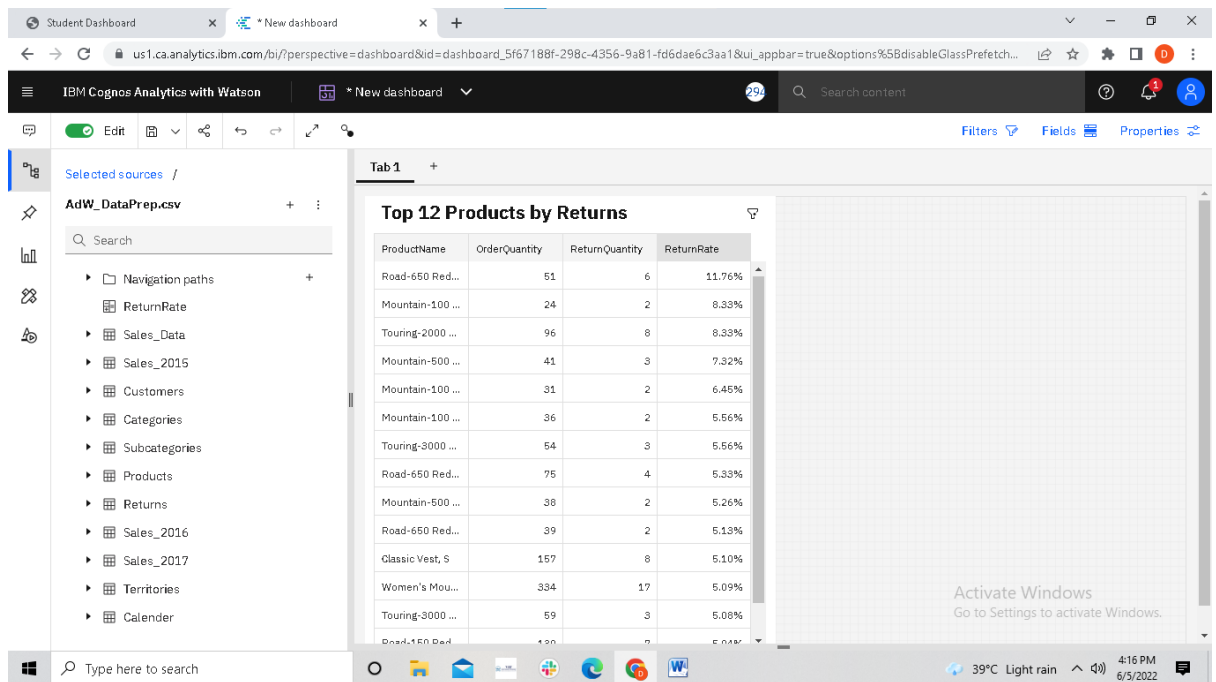


Fig: Top 12 products by Returns(productName,OrderQuantity,ReturnQuantity,ReturnRate)

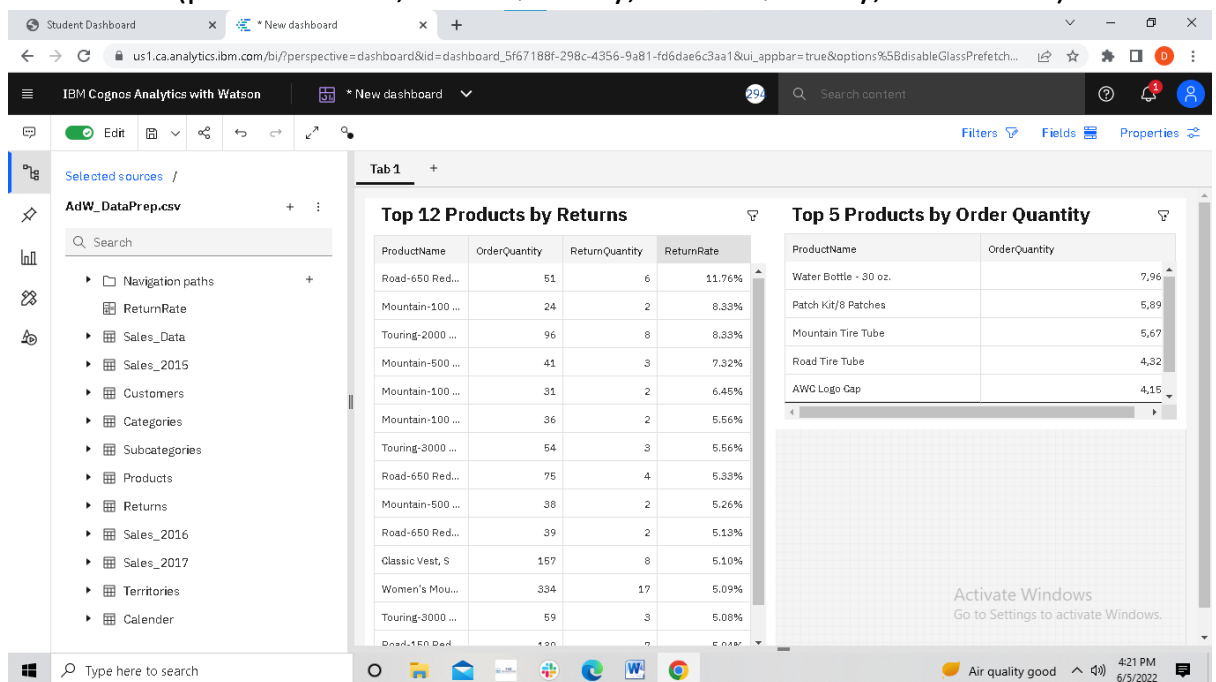


Fig: Top 5 product by OrderQuantity

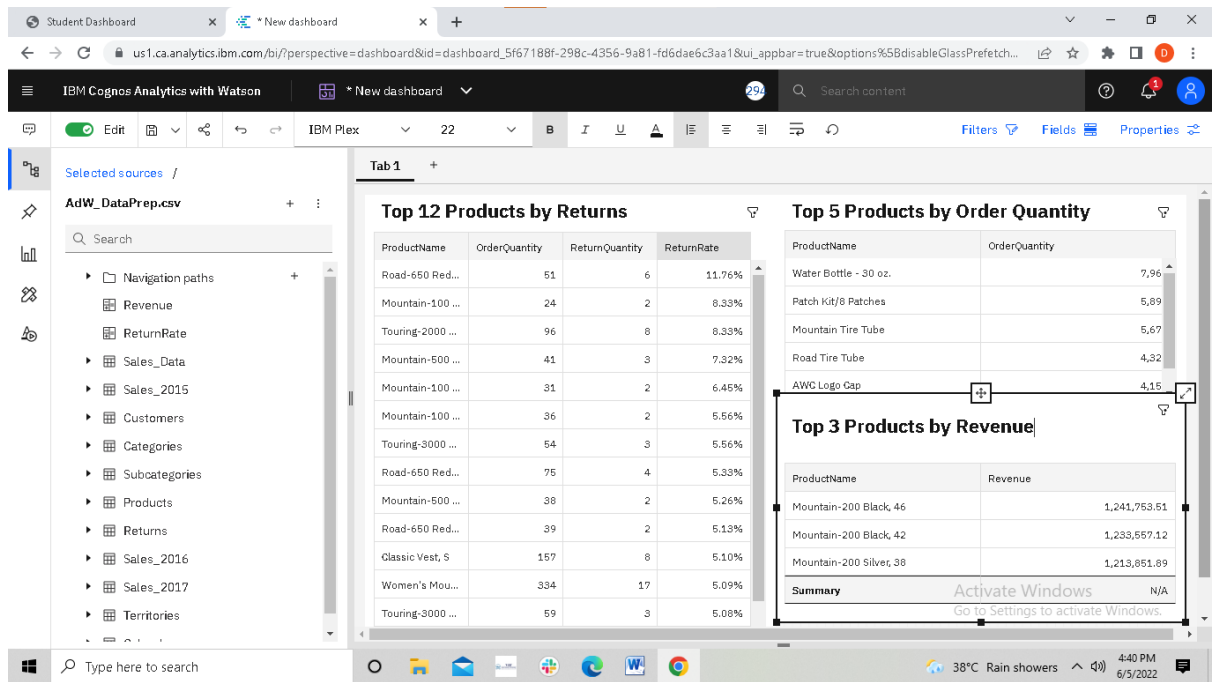


Fig: Top 3 products by revenue

7. Showing the Revenue by Education Level with Tree Map

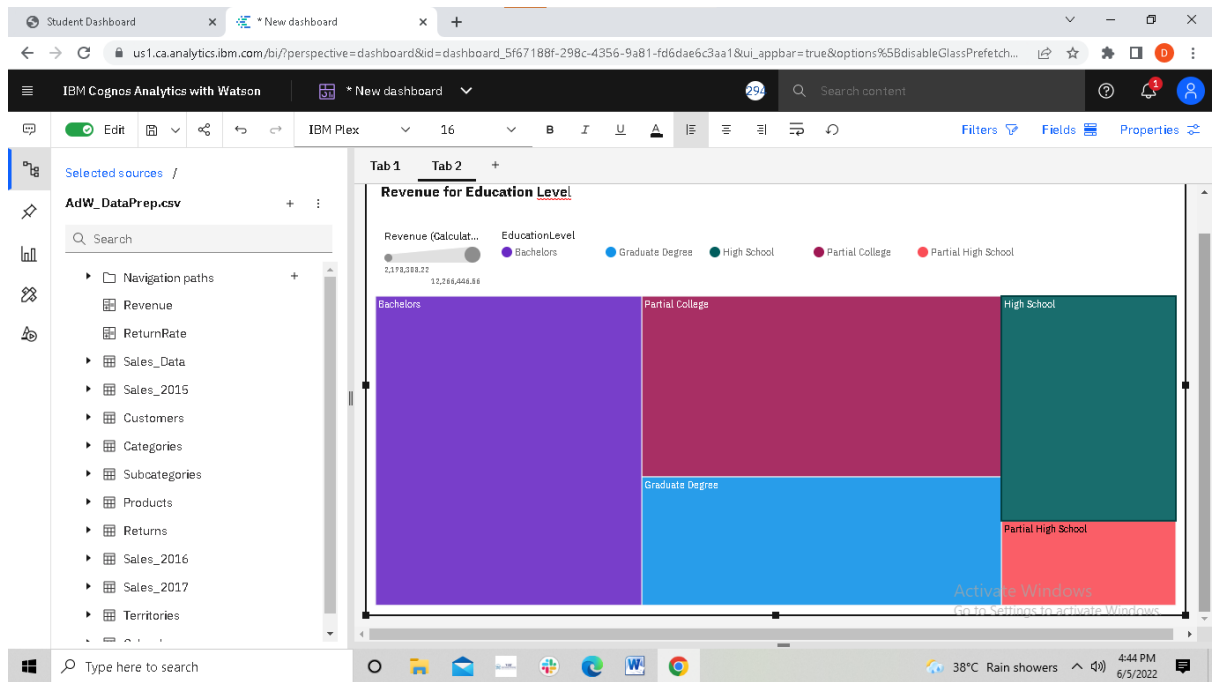


Fig: Revenue for EducationLevel

8. Country Wise Sales using Geographical map.

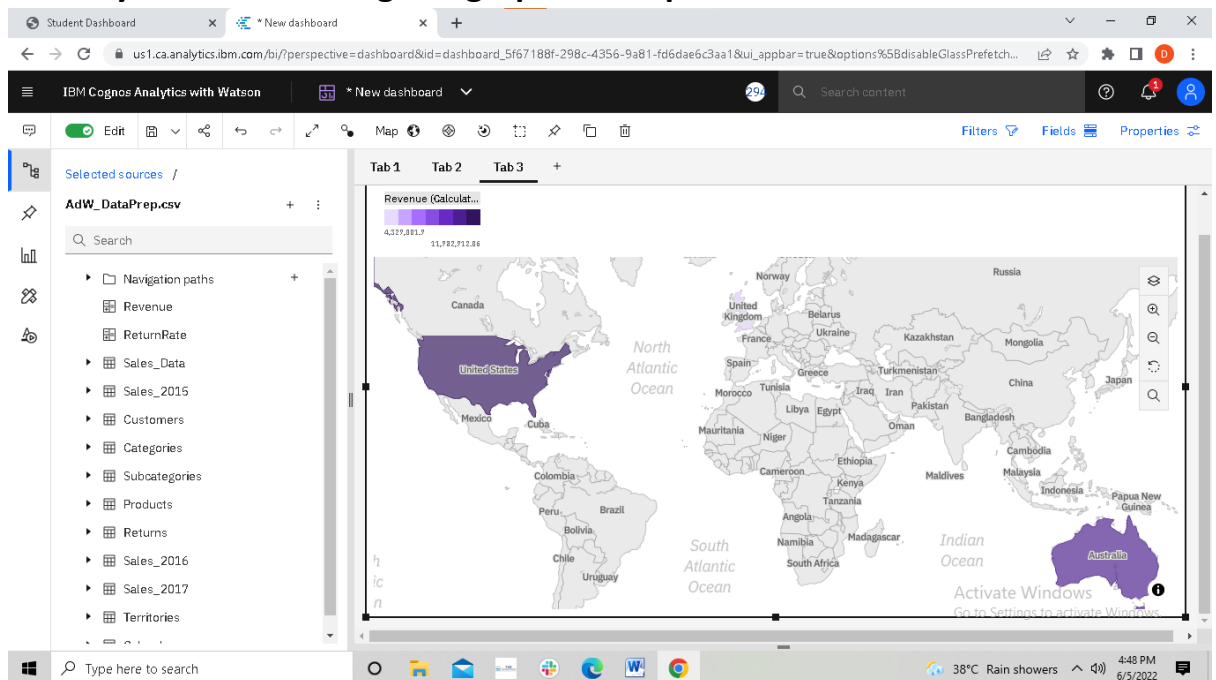


Fig: Revenue for Country Regions

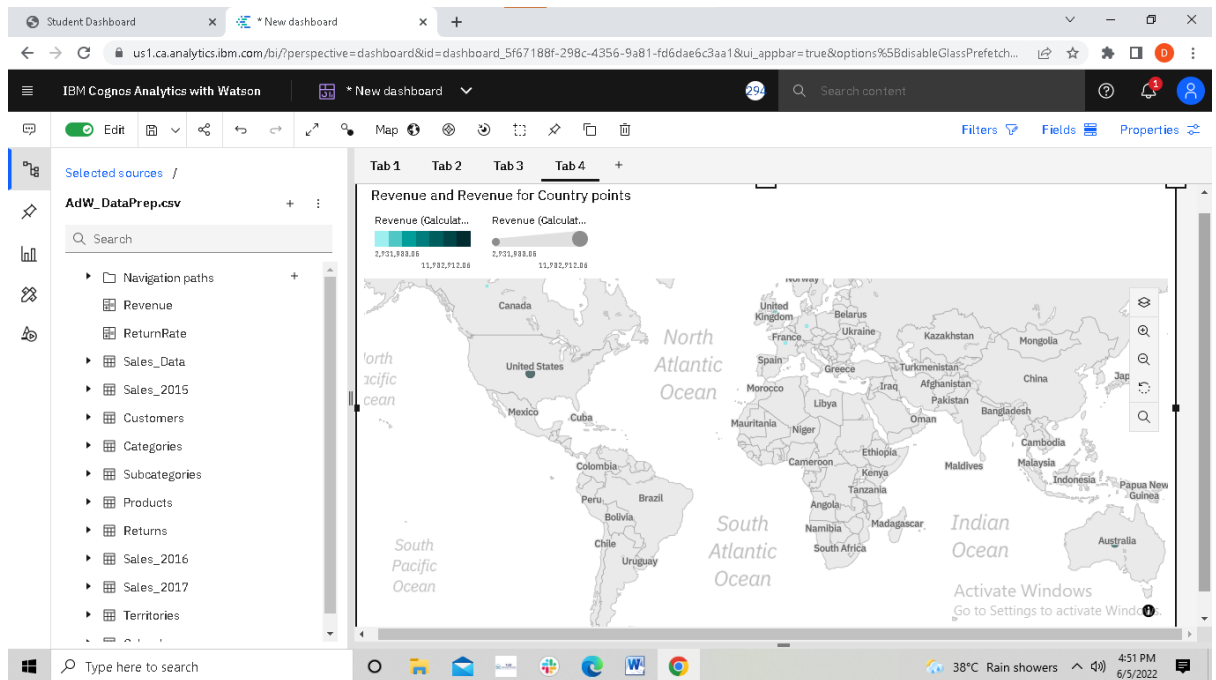


Fig: Revenue and Revenue for Country Points

9. Revenue by month using Pie Chart

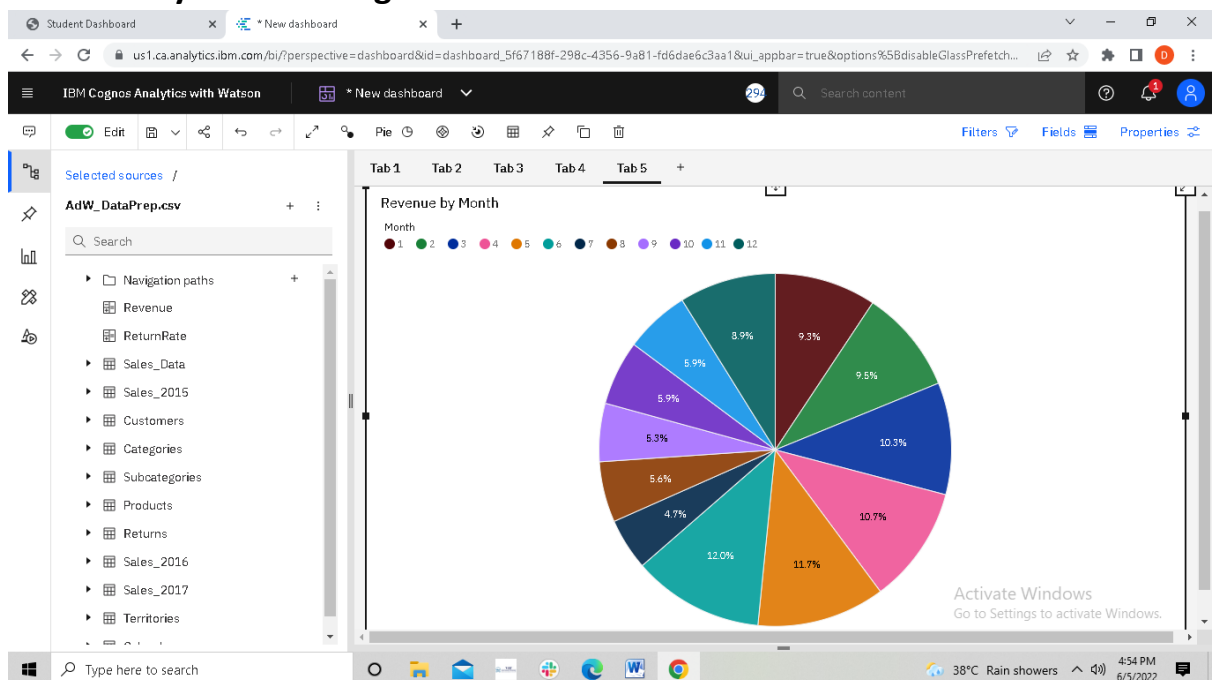


Fig: revenue by month

10. Summary of Revenue, Orders and Returns.

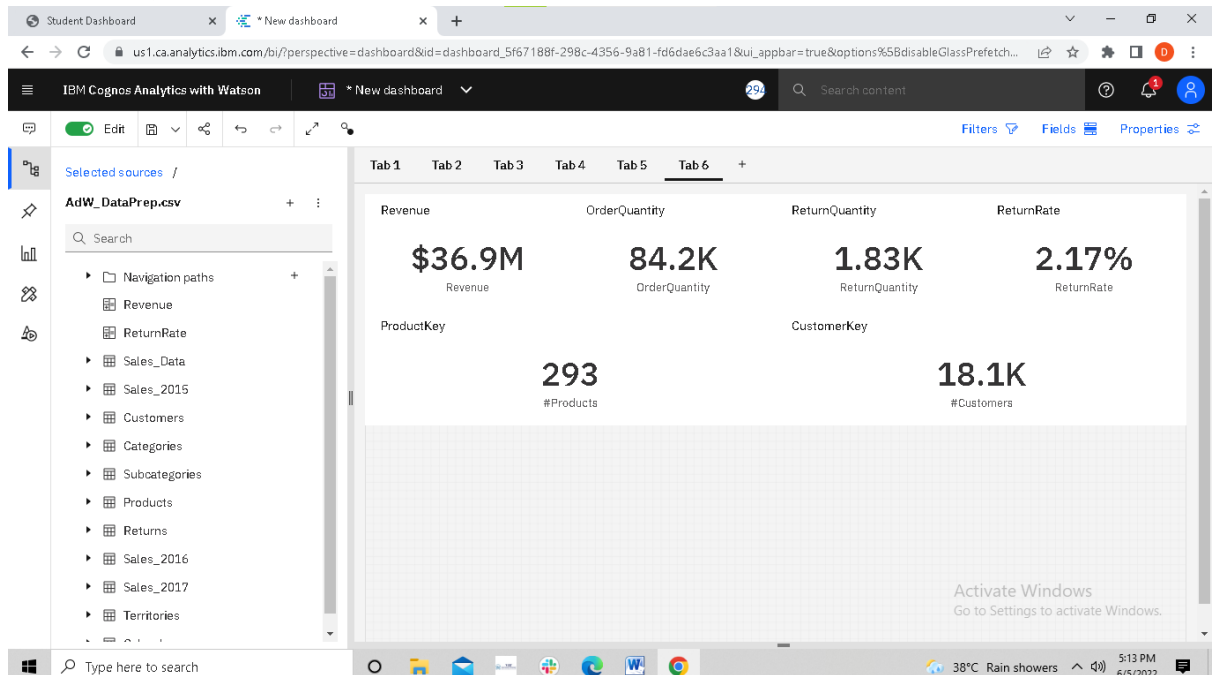


Fig: summary of Revenue order and returns

11. Monthly Forecast of Revenue

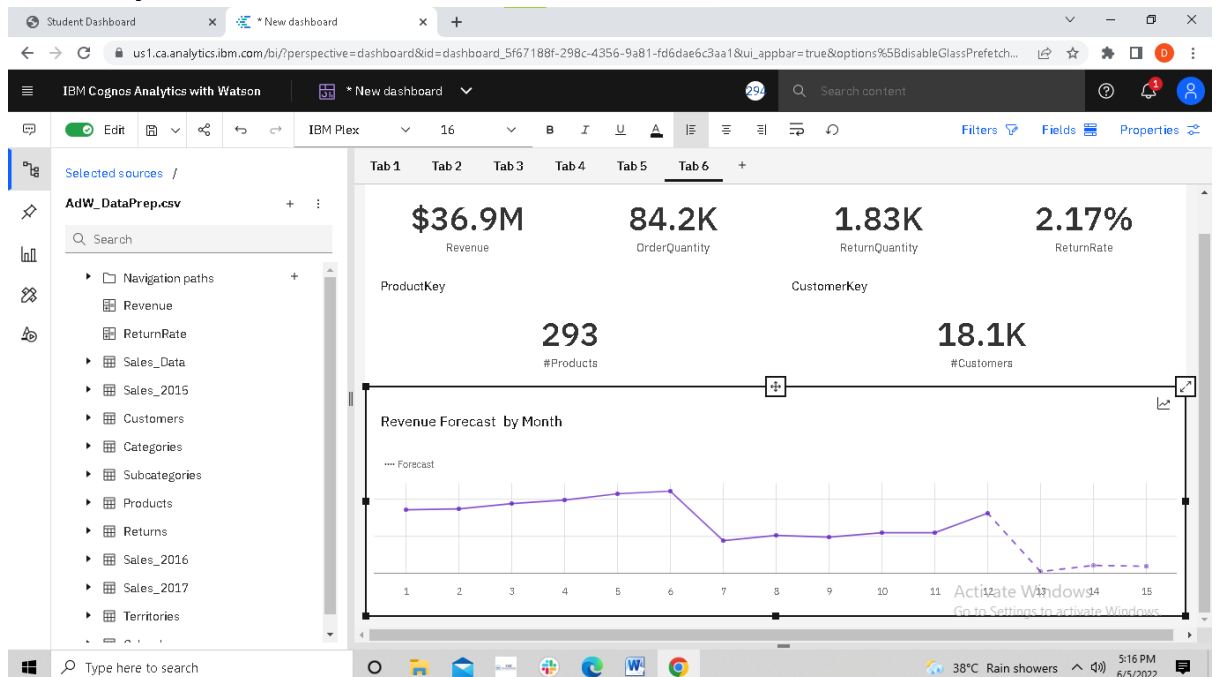


Fig: Revenue Forecast

Advantage and Disadvantage of creating Dashboard

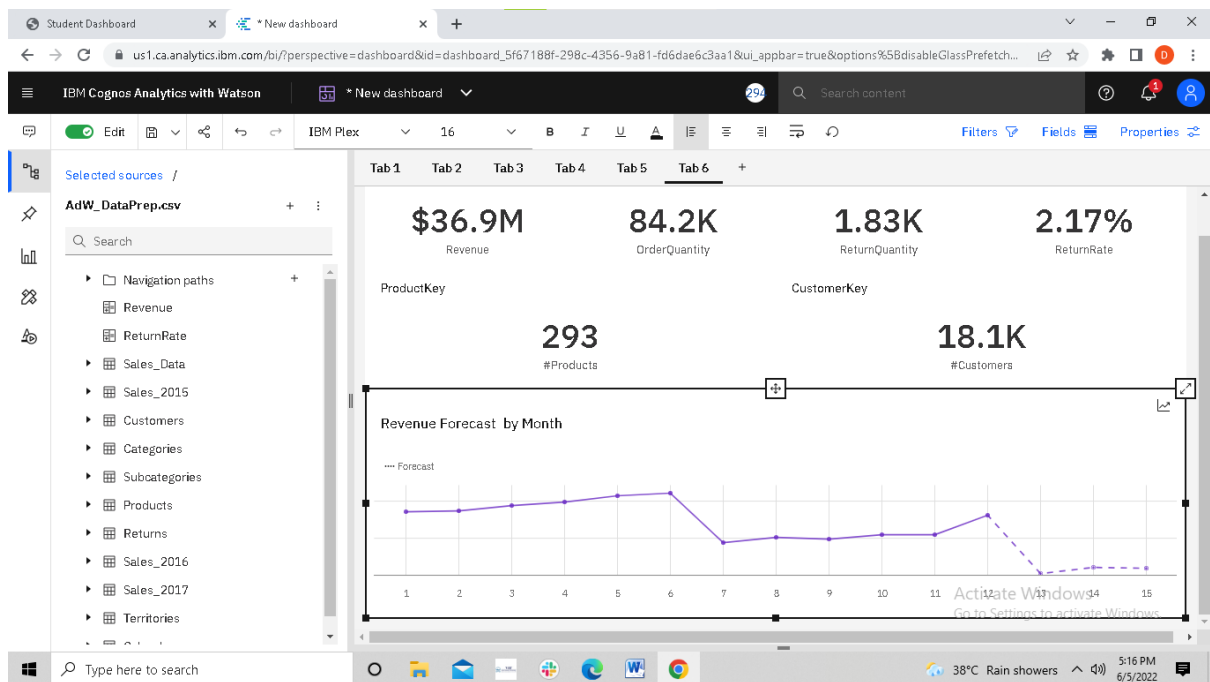
Advantage:

- Enhanced Visibility: Dashboards increase visibility by making information available whenever it is needed, allowing organisations to better adapt to changing market conditions.
- Timesaving Efficiency: We no longer waste significant time creating reports from numerous systems thanks to dashboards. Instead, data is extracted from a source and shown as an easy-to-understand visual summary.
- Better Forecasting: Using historical data, future demand may be more precisely forecasted with more insight into the data. Businesses may prepare for demand variations more effectively, defining quantifiable targets and deliverables for improved success.
- Better Decision Making: A dashboard helps firms to analyse crucial data quickly and thoroughly, whether you're offering reporting and analysis for the entire organisation or functional sections of the business. Visualized interaction is used to convey large volumes of information in an understandable manner. Better business decisions may be made with the capacity to clearly discern what the data truly means.

Disadvantage:

- Users attempting to include too much information without comprehending restrictions or taking into account their individual demands from the spectrum of distinct measurables deep data analysis presents.
- The technology used to create dashboards differs from other software solutions already in use in businesses and might be difficult to grasp at first.
- The company has no set rules or hierarchy for how dashboard analytics are used. This implies that each employee may apply the measurements in a variety of ways, resulting in a diversified collection of data being reported.

Dashboard



Conclusion

This way, with the help of diagrams, graphs, and maps we can understand given data. This understanding of data allows us to ask the right questions to reach our desired goals by optimizing methods. With this project, we learned how to upload and prepare data. We also statistical concepts which helped in calculations and plotting of graphs and maps to make a dashboard.