

Inventory Management Using IBM Cognos Analytics

Project Report

Data Analytics

Submitted by:

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19BCE2620

VIT, Vellore

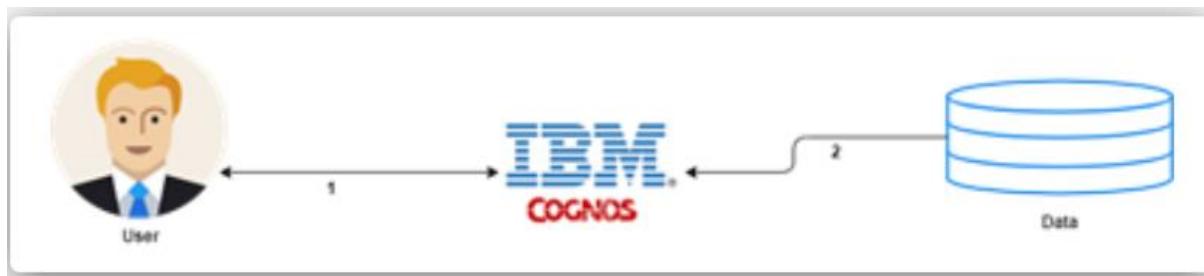
Introduction to the project:

This dataset contains a lot of historical sales data of a Brazilian top retailer

Basic Questions of every retailer: How much inventory should I carry? Too much inventory means working capital costs, operational costs and a complex operation, lack of inventory leads to lost sales, unhappy customers and a damaged brand.

This is why short-term forecasting is so important in the retail and consumer goods industry.

Architecture:



Objective of the project:

- Know fundamental concepts and can work on IBM Cognos Analytics
- Gain a broad understanding of plotting different graphs.
- Able to create meaningful dashboards

Project flow:

The following tasks have to be done:

- Working with the Dataset
- Understand the Dataset
- Loading the Dataset
- Building of Visualizations with Analysis of Forecasting of Goods.

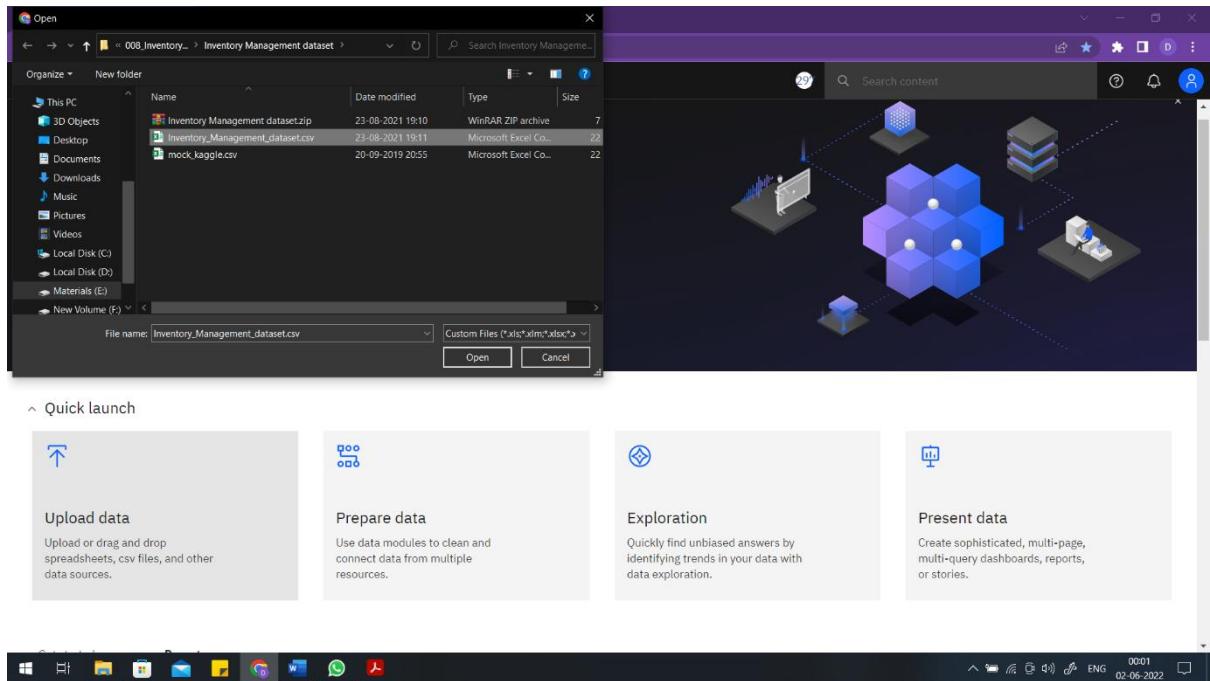
Visualizations to be created:

- Year Wise Price Using Line Graph
- Year Wise Stock Using Line Graph
- Top10 Sales by Year Using Line Graph
- Top10 Revenue by Year Using Line Graph
- Monthly Stock Using Heat Map
- Monthly Sales Using Tree Map
- Monthly Revenue by Pie Chart
- Summary Cards of Total Revenue, Sales, Stock, Price

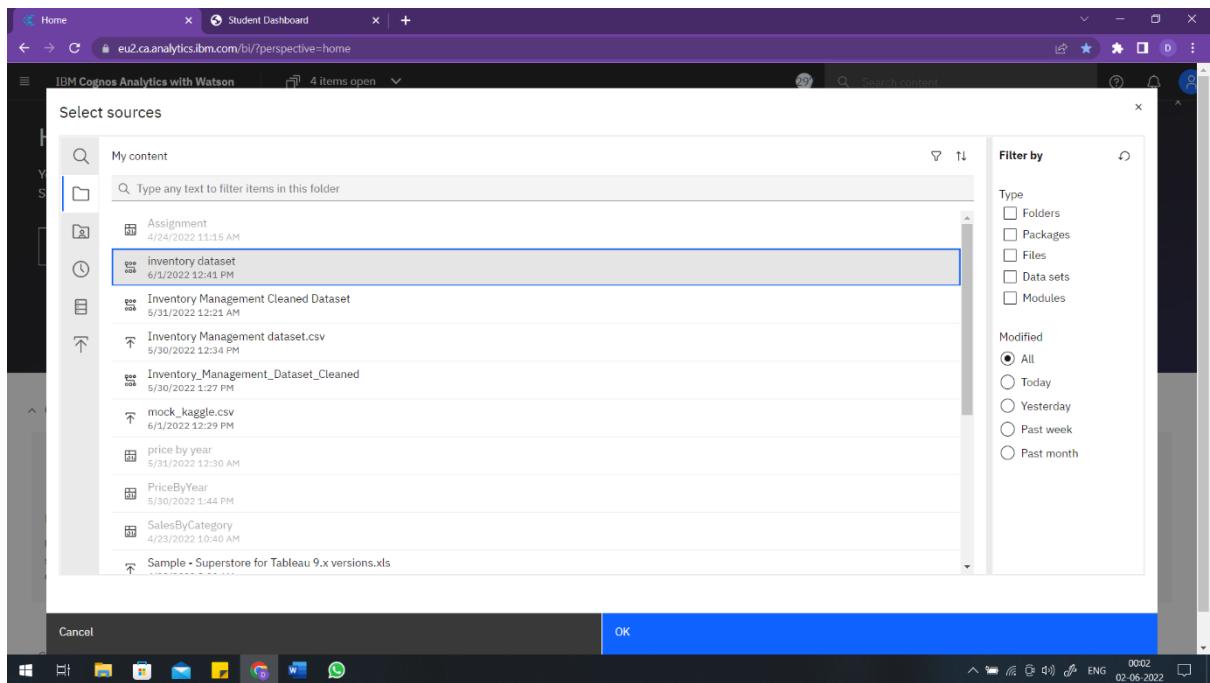
Link to dashboard:

https://eu2.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Ftop10salesby%2Byear&action=view&mode=dashboard

Loading the dataset:



Preparation of the dataset:



Data Cleaning:

The screenshot shows the IBM Cognos Analytics with Watson interface. A modal dialog titled "Clean - data" is open over a grid of data. The grid has columns: Row Id, data, sales, stock, and preco. The "data" column is currently selected. The modal contains two options under "NULL values": "Replace this value with NULL" (unchecked) and "Replace NULL values with" (checked, showing "2000-01-01").

Row Id	data	sales	stock	preco
1	1/1/14	0	4972	1.29
2				1.29
3				1.29
4		2000-01-01		1.29
5		2000-01-01		1.29
6		2000-01-01		1.29
7				1.29
8				1.29
9				1.09
10	1/10/14	88	5043	1.09
11	1/11/14	188	5239	1.09
12	1/12/14	121	5118	1.09
13	1/13/14	134	4984	1.09
14	1/14/14	80	4904	1.09

The screenshot shows the IBM Cognos Analytics with Watson interface. A modal dialog titled "Clean - stock" is open over a grid of data. The grid has columns: Row Id, data, sales, stock, and price. The "stock" column is currently selected. The modal contains two options under "NULL values": "Replace this value with NULL" (unchecked) and "Replace NULL values with" (checked, showing "0").

Row Id	data	sales	stock	price
1	1/1/14	0	4972	1.29
2			0	1.29
3			0	1.29
4		0	0	1.29
5		0	0	1.29
6		0	0	1.29
7				1.29
8				1.29
9				1.09
10	1/10/14	88	5043	1.09
11	1/11/14	188	5239	1.09
12	1/12/14	121	5118	1.09
13	1/13/14	134	4984	1.09
14	1/14/14	80	4904	1.09

Screenshot of IBM Cognos Analytics with Watson interface showing a data module named "New data module". The "sales" column in the grid contains several NULL values. A modal dialog titled "Clean - sales" is open, specifically addressing the "NULL values" section. It shows two options: "Replace this value with NULL" (unchecked) and "Replace NULL values with" (checked, set to 0). The grid below shows 14 rows of data, with the first few rows having NULL values in the "sales" column.

Row Id	data	sales	stock	price
1	1/1/14	0	4972	1.29
2				1.29
3				1.29
4				1.29
5		0		1.29
6		0		1.29
7				1.29
8				1.29
9				1.09
10	1/10/14	88	5043	1.09
11	1/11/14	188	5239	1.09
12	1/12/14	121	5118	1.09
13	1/13/14	134	4984	1.09
14	1/14/14	80	4904	1.09

Screenshot of IBM Cognos Analytics with Watson interface showing a data module named "New data module". The "Sales" column in the grid is selected. The properties panel on the right is open, showing the "General" tab. The "Label" field is set to "Sales". The "Data type" field is set to "Integer". The "Represents" dropdown is set to "Default".

Month_Date	Row Id	data	Sales
1	1	2014-01-01	0
1	2	2014-01-02	70
1	3	2014-01-03	59
1	4	2014-01-04	93
1	5	2014-01-05	96
1	6	2014-01-06	145
1	7	2014-01-07	179
1	8	2014-01-08	321
1	9	2014-01-09	125
1	10	2014-01-10	88
1	11	2014-01-11	188
1	12	2014-01-12	121
1	13	2014-01-13	134
1	14	2014-01-14	80

The screenshot shows the IBM Cognos Analytics with Watson interface. On the left, there's a sidebar with a tree view of data modules, including 'New data module', 'Navigation paths', 'Inventory M...ataset.csv', and several date-related items like 'Day_Date', 'Year_Date', 'Month_Date', 'Row Id', 'data', 'Sales', 'Stock', and 'preco'. The 'Sales' item is currently selected. The main area displays a grid of data with columns: Month_Date, Row Id, data, Sales, and Stock. The 'Sales' column is highlighted with a blue border. To the right of the grid is a 'Properties' panel. Under the 'General' tab, the 'Label' is set to 'Sales', 'Usage' is set to 'Measure' with 'Total' selected, 'Data type' is 'Integer', and 'Represents' is 'Default'. Other tabs in the properties panel include 'Relationships' and 'Custom tables'.

Fig: preparing the sales attribute

This screenshot is similar to the previous one but shows the 'Stock' attribute being prepared. In the sidebar, 'Stock' is selected instead of 'Sales'. The main grid data remains the same. In the 'Properties' panel, the 'Label' is now 'Stock', 'Usage' is set to 'Attribute' with 'Count Distinct' selected, and 'Data type' is 'Integer'. The 'Navigation paths' tab is also visible in the properties panel.

The screenshot shows the IBM Cognos Analytics with Watson interface. On the left, there is a sidebar with a tree view of data modules, one of which is 'Stock' under 'Inventory M...dataset.csv'. The main area displays a grid of data with columns: Row Id, data, Sales, Stock, and preco. The 'Stock' column is selected. On the right, the 'Properties' panel is open for the 'Stock' attribute, showing the 'General' tab. The 'Label' field is set to 'Stock'. Other properties like 'Usage' (Measure), 'Aggregate' (Total), and 'Data type' (Integer) are also visible.

Row Id	data	Sales	Stock	preco
1	2014-01-01	0	4972	
2	2014-01-02	70	4902	
3	2014-01-03	59	4843	
4	2014-01-04	93	4750	
5	2014-01-05	96	4654	
6	2014-01-06	145	4509	
7	2014-01-07	179	4329	
8	2014-01-08	321	4104	
9	2014-01-09	125	4459	
10	2014-01-10	88	5043	
11	2014-01-11	188	5239	
12	2014-01-12	121	5118	
13	2014-01-13	134	4984	
14	2014-01-14	80	4904	

Fig: preparing the stock attribute

This screenshot shows the same interface as the previous one, but the 'Price' attribute is now selected in the grid. The 'Properties' panel on the right shows the 'General' tab with the 'Label' field set to 'Price'. The 'Data type' is set to 'Decimal' and the 'Default' value is '1.29'. Other properties like 'Usage' (Measure), 'Aggregate' (Total), and 'Comments' are also visible.

data	Sales	Stock	Price
2014-01-01	0	4972	1.29
2014-01-02	70	4902	1.29
2014-01-03	59	4843	1.29
2014-01-04	93	4750	1.29
2014-01-05	96	4654	1.29
2014-01-06	145	4509	1.29
2014-01-07	179	4329	1.29
2014-01-08	321	4104	1.29
2014-01-09	125	4459	1.09
2014-01-10	88	5043	1.09
2014-01-11	188	5239	1.09
2014-01-12	121	5118	1.09
2014-01-13	134	4984	1.09
2014-01-14	80	4904	1.09

Fig: preparing price attribute

Screenshot of the IBM Cognos Analytics with Watson interface showing the Data module editor.

The left sidebar shows the "Data module" tree:

- New data module
- Navigation paths
- Inventory M...ataset.csv
 - # Day_Date
 - # Year_Date
 - # Month_Date
 - # Row Id
 - Year
 - Sales
 - Stock
 - Price

The main area displays a grid of data with the following columns:

	Month_Date	Row Id	Year	Sales
1	1	1	2014-01-01	0
1	1	2	2014-01-02	70
1	1	3	2014-01-03	59
1	1	4	2014-01-04	93
1	1	5	2014-01-05	96
1	1	6	2014-01-06	145
1	1	7	2014-01-07	179
1	1	8	2014-01-08	321
1	1	9	2014-01-09	125
1	1	10	2014-01-10	88
1	1	11	2014-01-11	188
1	1	12	2014-01-12	121
1	1	13	2014-01-13	134
1	1	14	2014-01-14	80

The Properties panel on the right shows the following settings for the "Month_Date" attribute:

- General:
 - Label: Month_Date
 - Hide from users:
 - View or edit: [View or edit >](#)
 - Usage: Attribute
 - Aggregate: Count Distinct
 - Data type: Integer
 - Represents: Default
 - Comments: (empty)
 - Screen tip: (empty)
- Navigation paths: (disabled)

Screenshot of the IBM Cognos Analytics with Watson interface showing the Data module editor.

The left sidebar shows the "Data module" tree:

- New data module
- Navigation paths
- Inventory M...ataset.csv
 - # Day_Date
 - # Year_Date
 - # Month_Date
 - # Row Id
 - Year
 - Sales
 - Stock
 - Price

The main area displays a grid of data with the following columns:

	Month_Date	Row Id	Year	Sales
1	1	1	2014-01-01	0
1	1	2	2014-01-02	70
1	1	3	2014-01-03	59
1	1	4	2014-01-04	93
1	1	5	2014-01-05	96
1	1	6	2014-01-06	145
1	1	7	2014-01-07	179
1	1	8	2014-01-08	321
1	1	9	2014-01-09	125
1	1	10	2014-01-10	88
1	1	11	2014-01-11	188
1	1	12	2014-01-12	121
1	1	13	2014-01-13	134
1	1	14	2014-01-14	80

The Properties panel on the right shows the following settings for the "Month_Date" attribute:

- General:
 - Comments: (empty)
 - Screen tip: (empty)
- Navigation paths: (disabled)
- Members: Enabled
- Sort by: Month_Date
- Order: Ascending
- NULL values: First
- Advanced: Last

Screenshot of the IBM Cognos Analytics with Watson interface showing the Data module editor.

The left sidebar shows the "Data module" tree:

- New data module
- Navigation paths
- Inventory M...ataset.csv
 - # Day_Date
 - # Year_Date
 - # Month_Date
 - # Row Id
 - Year
 - Sales
 - Stock
 - Price

The main area displays a grid with columns: Month_Date, Row Id, Year, and Sales. The "Year" column is selected.

Month_Date	Row Id	Year	Sales
1	1	2014-01-01	0
1	2	2014-01-02	70
1	3	2014-01-03	59
1	4	2014-01-04	93
1	5	2014-01-05	96
1	6	2014-01-06	145
1	7	2014-01-07	179
1	8	2014-01-08	321
1	9	2014-01-09	125
1	10	2014-01-10	88
1	11	2014-01-11	188
1	12	2014-01-12	121
1	13	2014-01-13	134
1	14	2014-01-14	80

The Properties panel on the right shows the following settings for the "Year" column:

- General:
 - Label: Year
 - Hide from users: Off
 - Expression: View or edit >
 - Usage: Attribute
 - Aggregate: Count Distinct
 - Data type: Date
 - Represents: Time
 - Date
 - Lookup reference: None
 - Comments
- Navigation paths

Screenshot of the IBM Cognos Analytics with Watson interface showing the Data module editor.

The left sidebar shows the "Data module" tree:

- New data module
- Navigation paths
- Inventory M...ataset.csv
 - # Day_Date
 - # Year_Date
 - # Month_Date
 - # Row Id
 - Year
 - Sales
 - Stock
 - Price

The main area displays a grid with columns: Month_Date, Row Id, Year, and Sales. The "Year" column is selected.

Month_Date	Row Id	Year	Sales
1	1	2014-01-01	0
1	2	2014-01-02	70
1	3	2014-01-03	59
1	4	2014-01-04	93
1	5	2014-01-05	96
1	6	2014-01-06	145
1	7	2014-01-07	179
1	8	2014-01-08	321
1	9	2014-01-09	125
1	10	2014-01-10	88
1	11	2014-01-11	188
1	12	2014-01-12	121
1	13	2014-01-13	134
1	14	2014-01-14	80

The Properties panel on the right shows the following settings for the "Year" column:

- General:
 - None
 - Comments
 - Screen tip
 - Members: Enabled
 - Sort by: Year
 - Order: Ascending
 - Advanced
- Navigation paths

Screenshot of the IBM Cognos Analytics with Watson interface showing the 'Data format' dialog box.

Data format

Column: Month_Date

Format type: Date

Date separator: /

Date style: Short

Date ordering: Default

Missing value characters: <empty>

Advanced options | **Reset properties**

Cancel | **OK**

The background shows a table with columns Stock and Price, containing data from 4972 to 4904 with values ranging from 1.29 to 1.09.

Screenshot of the IBM Cognos Analytics with Watson interface showing the 'Data format' dialog box.

Data format

Column: Year

Format type: Date

Date separator: /

Date style: Short

Date ordering: Default

Missing value characters: <empty>

Advanced options | **Reset properties**

Cancel | **OK**

The background shows a table with columns Stock and Price, containing data from 4972 to 4904 with values ranging from 1.29 to 1.09.

Screenshot of the IBM Cognos Analytics with Watson interface showing the 'Data format' dialog box for the 'Sales' column.

Data format

Column: Sales

Format type: Number

Number of decimal places: 0

Negative sign symbol: Default

Use thousands separator: No

Negative sign position: Default

Missing value characters: <empty>

Advanced options | **Reset properties**

Cancel | **OK**

The background shows a table with columns 'Stock' and 'Price'. The data rows are as follows:

Stock	Price
4972	1.29
4902	1.29
4843	1.29
4750	1.29
4654	1.29
4509	1.29
4329	1.29
4104	1.29
4459	1.09
5043	1.09
5239	1.09
5118	1.09
4984	1.09
4904	1.09

Screenshot of the IBM Cognos Analytics with Watson interface showing the 'Data format' dialog box for the 'Stock' column.

Data format

Column: Stock

Format type: Number

Number of decimal places: 0

Negative sign symbol: Default

Use thousands separator: No

Negative sign position: Default

Missing value characters: <empty>

Advanced options | **Reset properties**

Cancel | **OK**

The background shows a table with columns 'Stock' and 'Price'. The data rows are as follows:

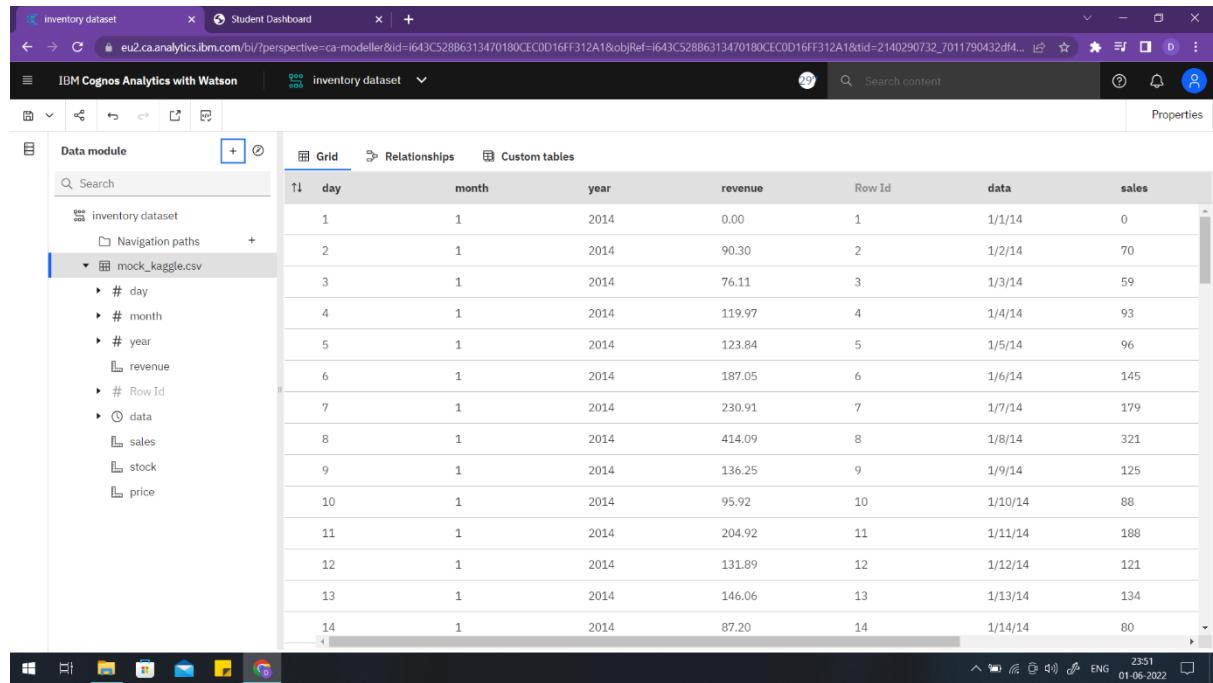
Stock	Price
4972	1.29
4902	1.29
4843	1.29
4750	1.29
4654	1.29
4509	1.29
4329	1.29
4104	1.29
4459	1.09
5043	1.09
5239	1.09
5118	1.09
4984	1.09
4904	1.09

The screenshot shows the IBM Cognos Analytics with Watson interface. A 'Data format' dialog box is open over a data preview window. The dialog is titled 'Data format' and specifies 'Column: Price'. The 'Format type:' dropdown is set to 'Number'. Under 'Number' settings, the 'Number of decimal places' is set to 4, 'Negative sign symbol' is 'Default', 'Use thousands separator' is 'No', 'Negative sign position' is 'Default', and 'Missing value characters' is '<empty>'. At the bottom right of the dialog are 'Cancel' and 'OK' buttons. The background shows a preview of a table with columns 'Stock' and 'Price', containing data like 4972, 1.29, etc.

This screenshot is identical to the one above, but the 'Number of decimal places' field in the 'Data format' dialog has been changed to 3. All other settings remain the same. The background data preview is also identical.

Fig: preparing the date attribute with the creation of month, day and year from the given date attribute

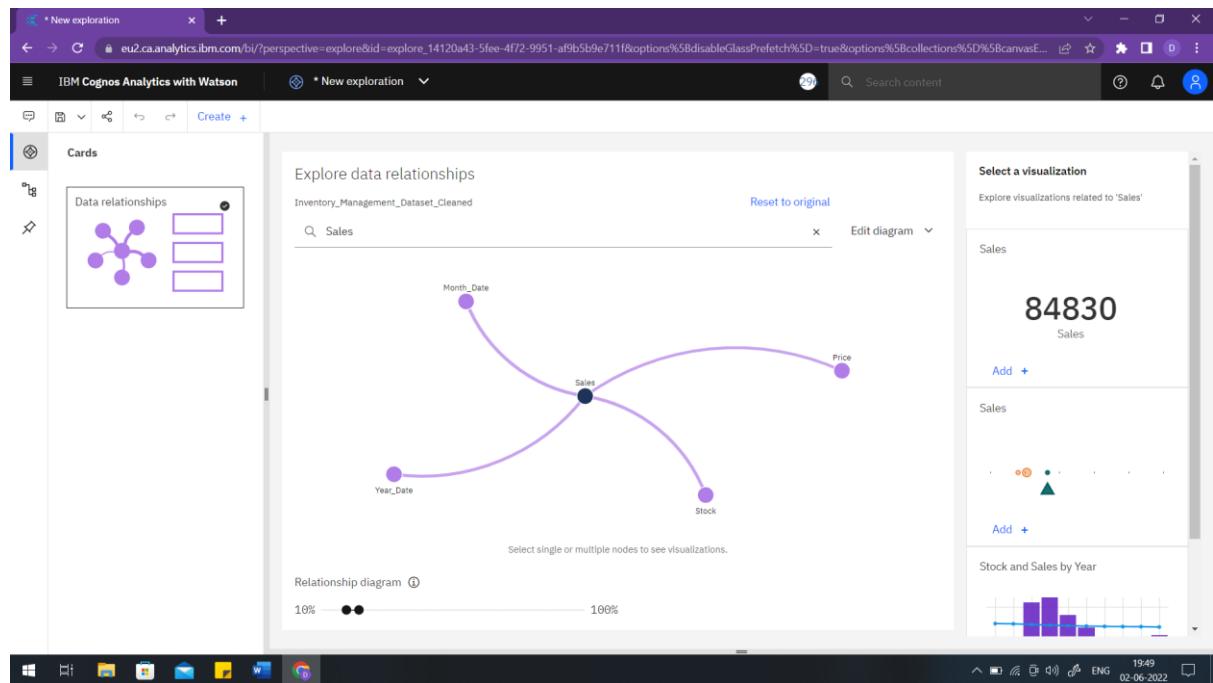
Dataset after processing:



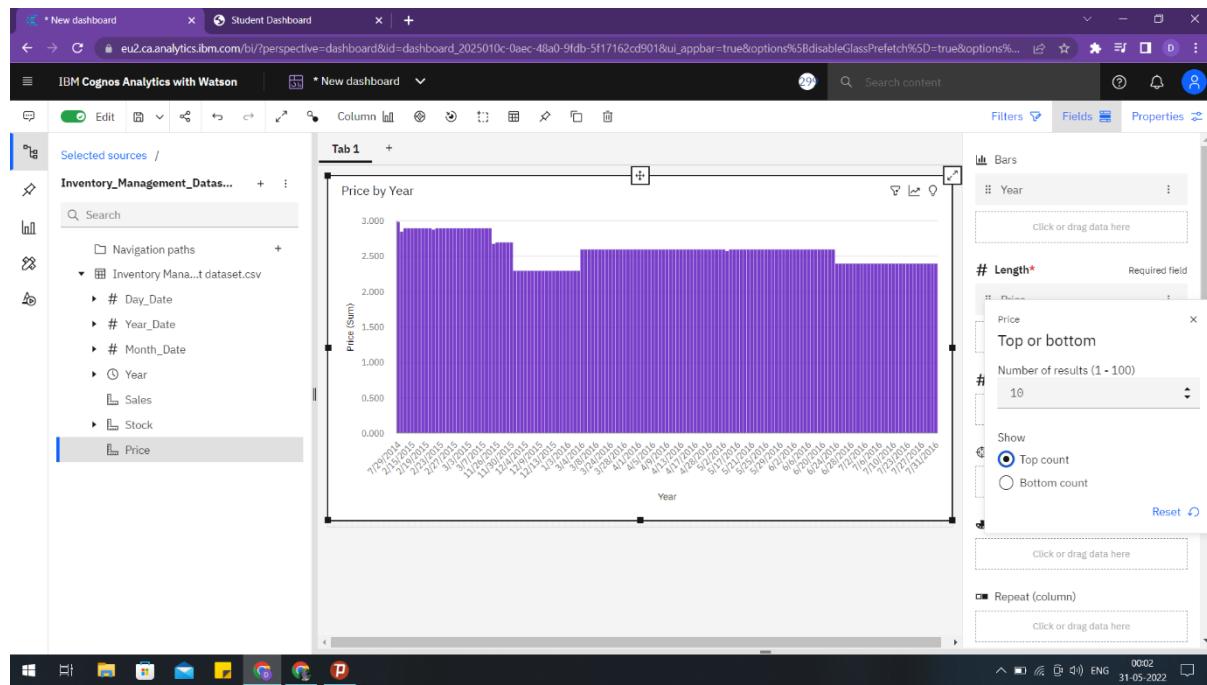
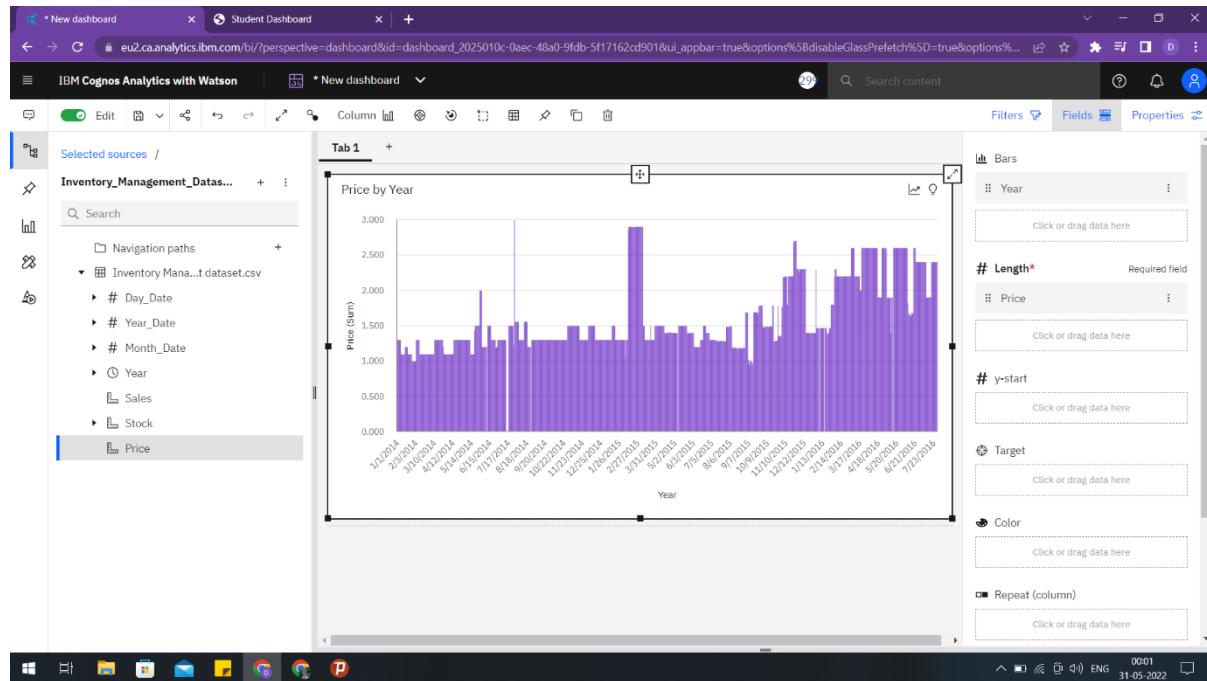
The screenshot shows the IBM Cognos Analytics with Watson interface. On the left, there's a sidebar titled "Data module" with a search bar and a tree view of datasets. Under "mock_kaggle.csv", several columns are listed: # day, # month, # year, revenue, Row Id, data, sales, stock, and price. The main area displays a grid of data with columns: day, month, year, revenue, Row Id, data, and sales. The data shows 14 rows of sales data for January 2014, with values ranging from 0.00 to 321.

day	month	year	revenue	Row Id	data	sales
1	1	2014	0.00	1	1/1/14	0
2	1	2014	90.30	2	1/2/14	70
3	1	2014	76.11	3	1/3/14	59
4	1	2014	119.97	4	1/4/14	93
5	1	2014	123.84	5	1/5/14	96
6	1	2014	187.05	6	1/6/14	145
7	1	2014	230.91	7	1/7/14	179
8	1	2014	414.09	8	1/8/14	321
9	1	2014	136.25	9	1/9/14	125
10	1	2014	95.92	10	1/10/14	88
11	1	2014	204.92	11	1/11/14	188
12	1	2014	131.89	12	1/12/14	121
13	1	2014	146.06	13	1/13/14	134
14	1	2014	87.20	14	1/14/14	80

Data exploration:



Creation of dashboard:



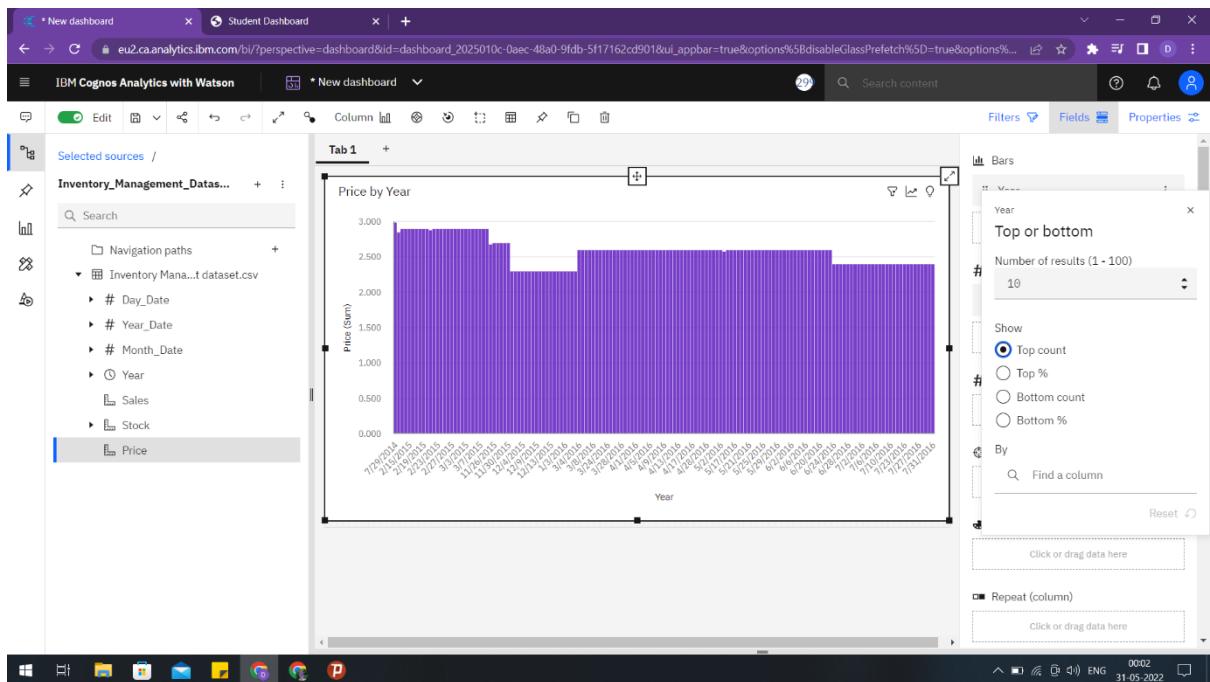
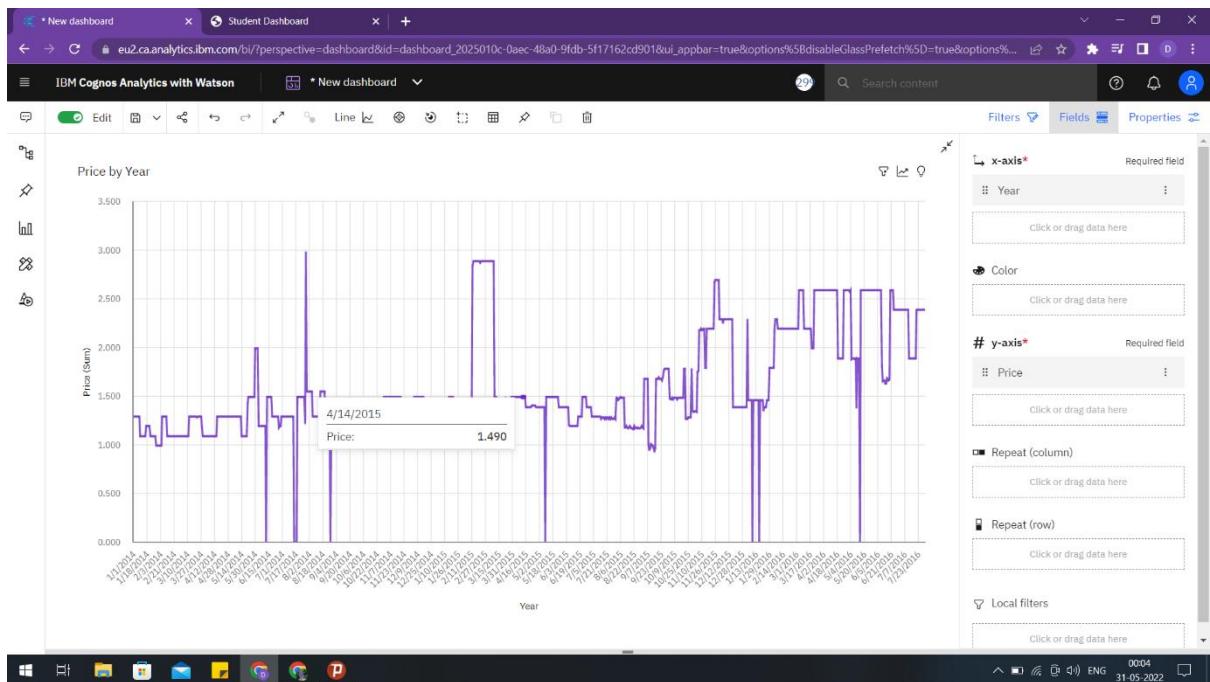


Fig: column chart for price by year



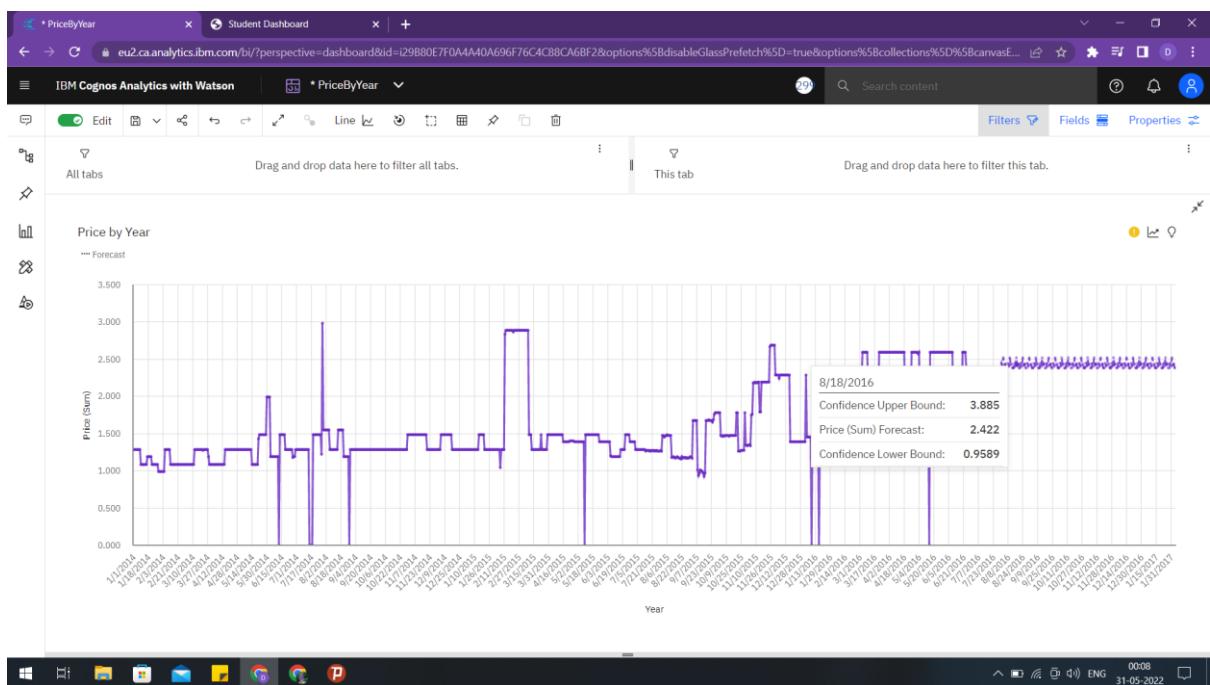
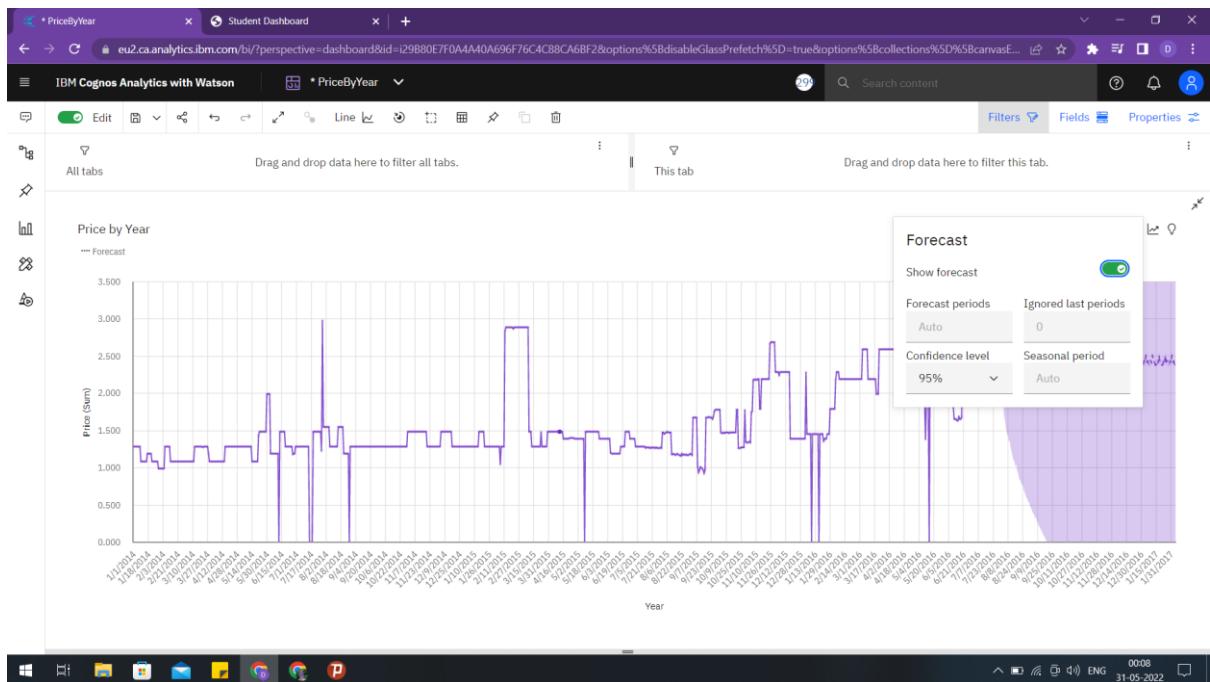
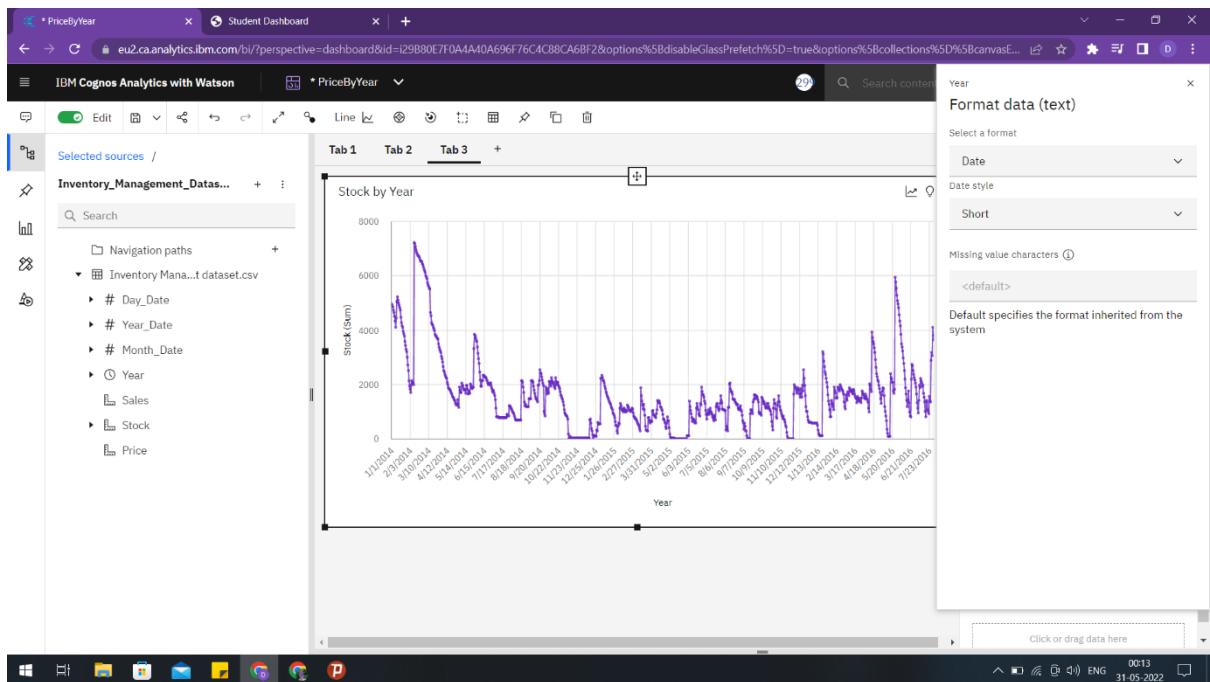
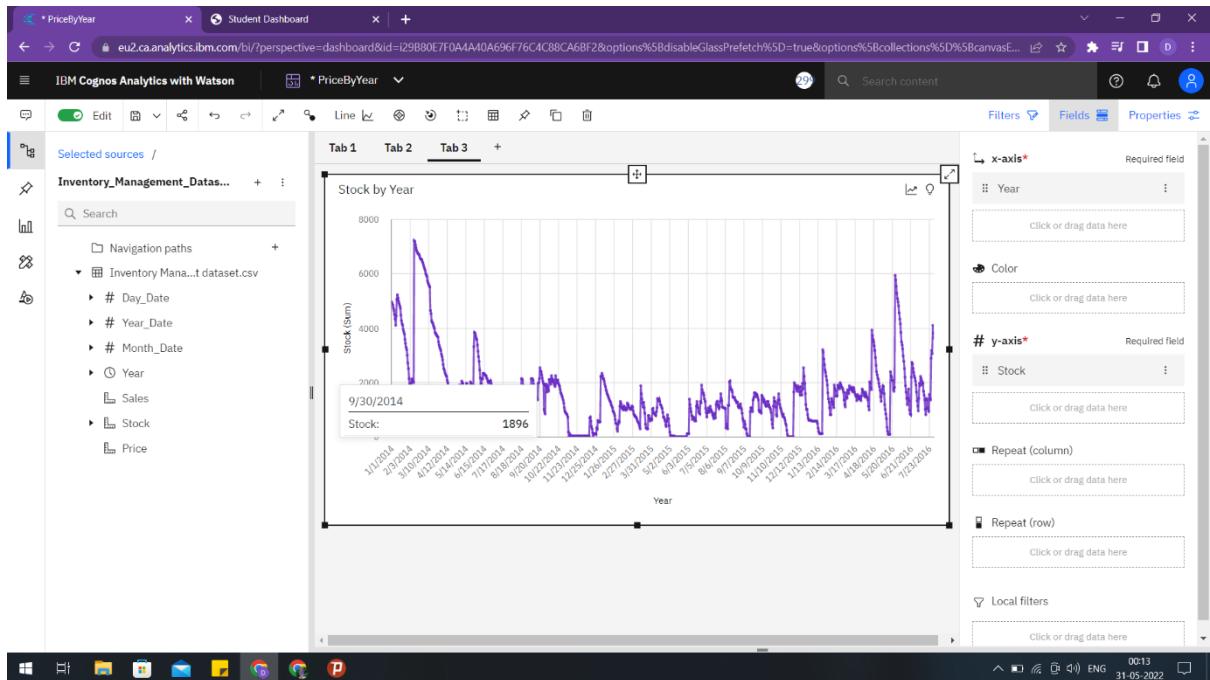


Fig: line chart for price by year



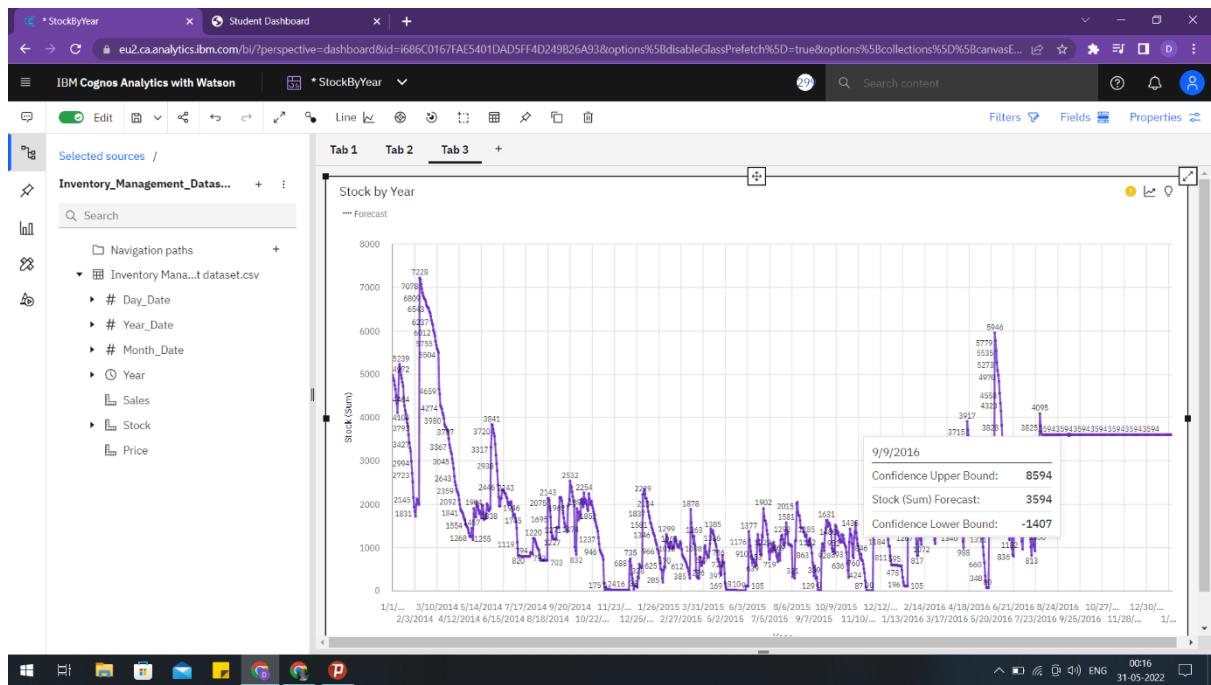
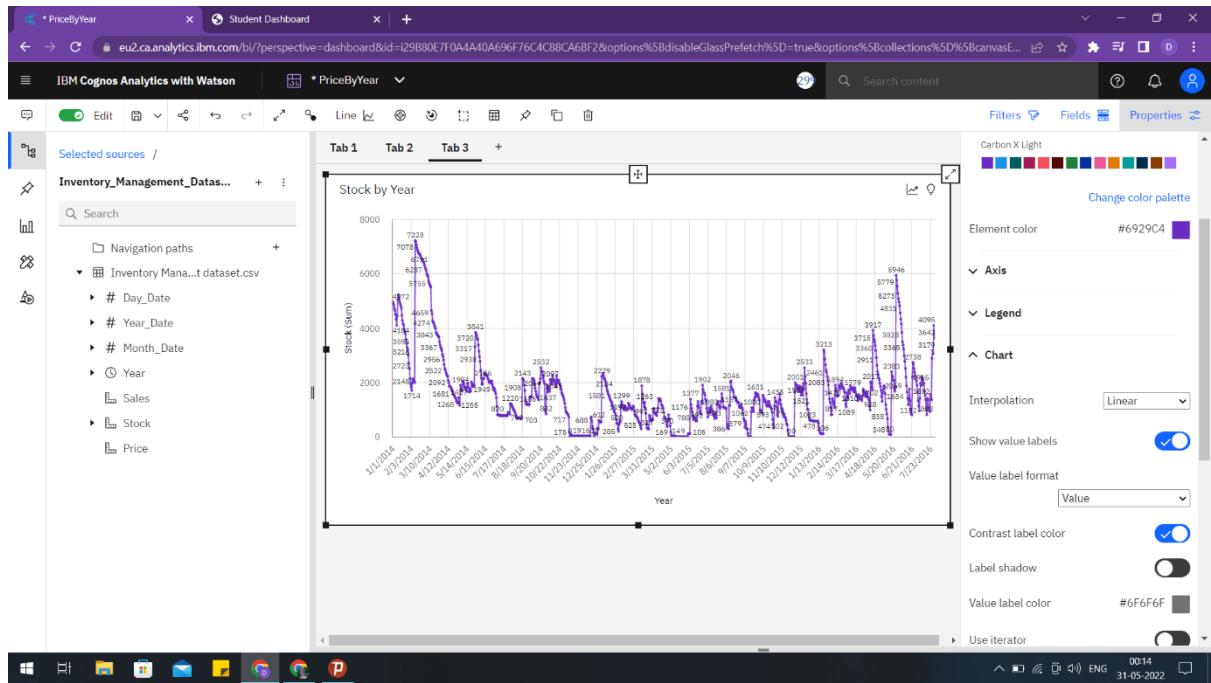
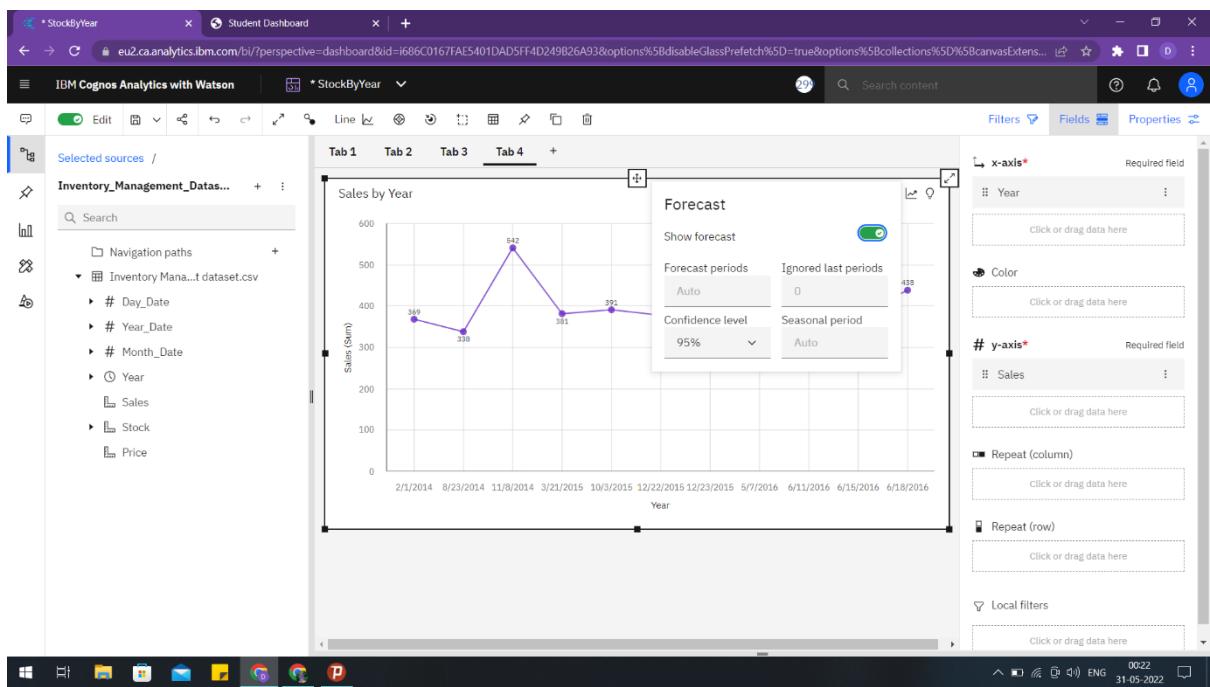
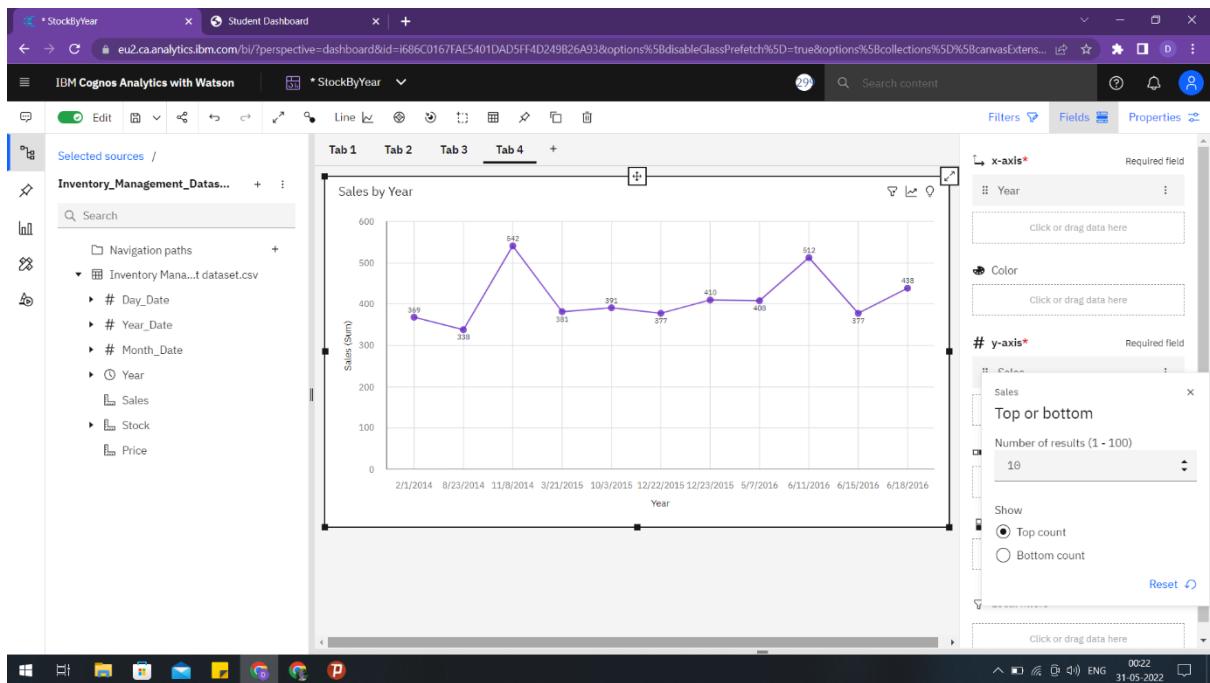
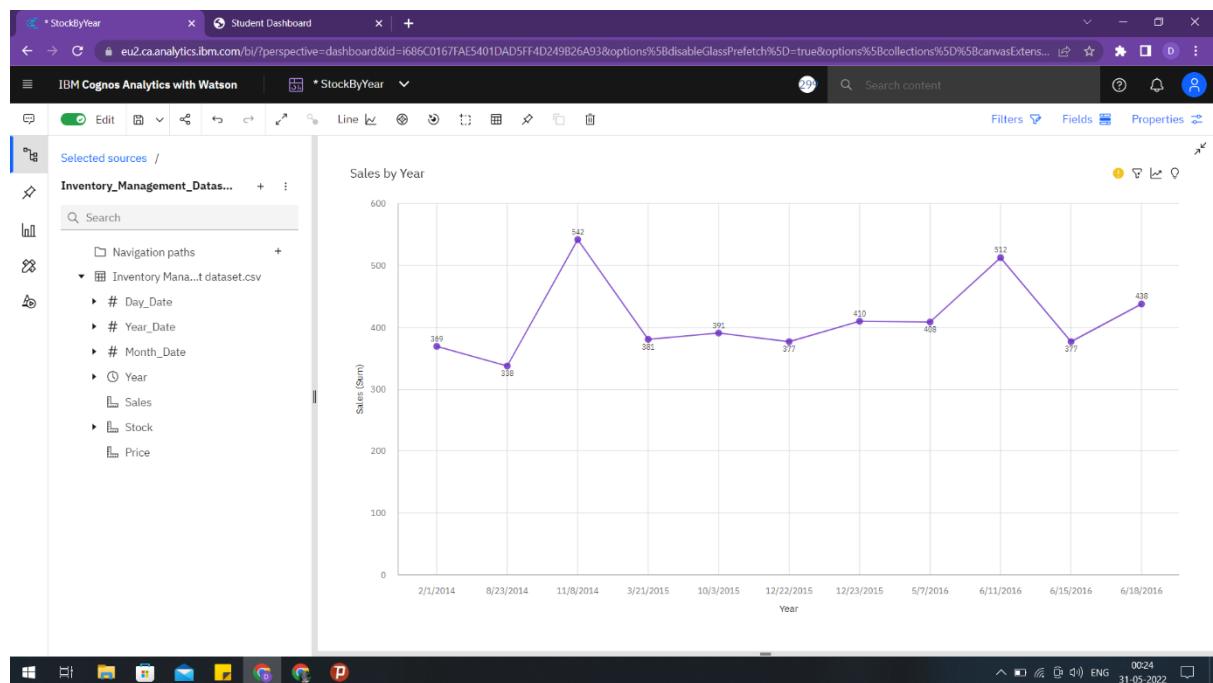
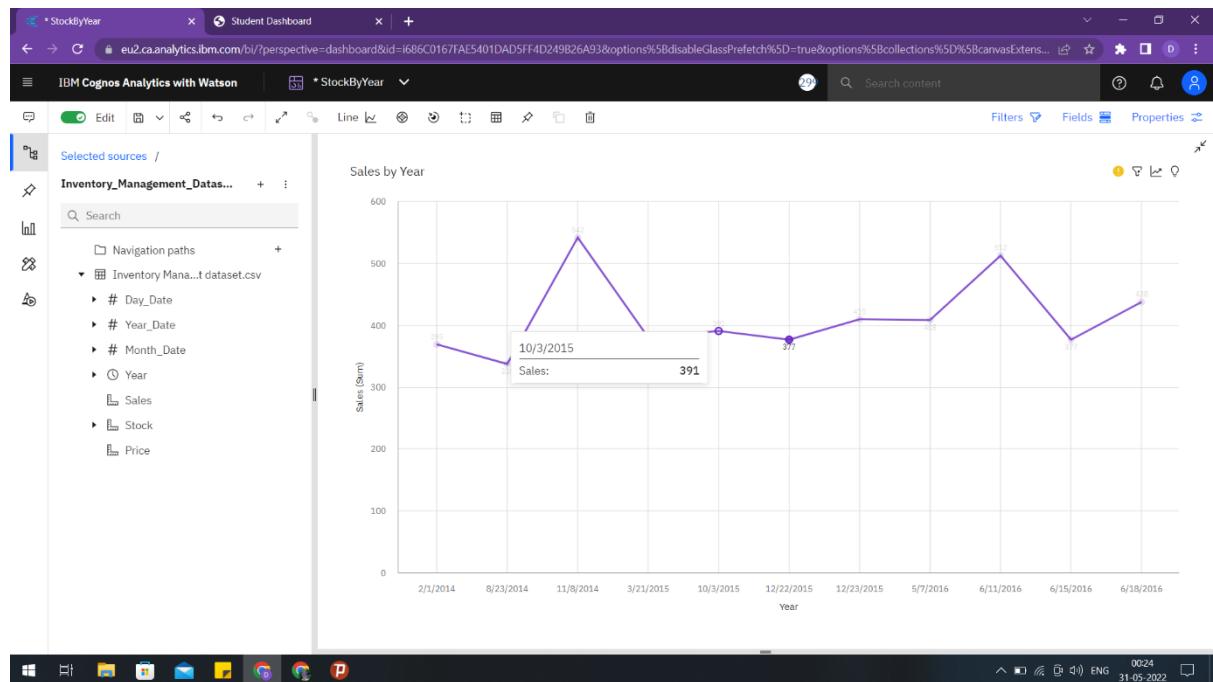


Fig: stock by year





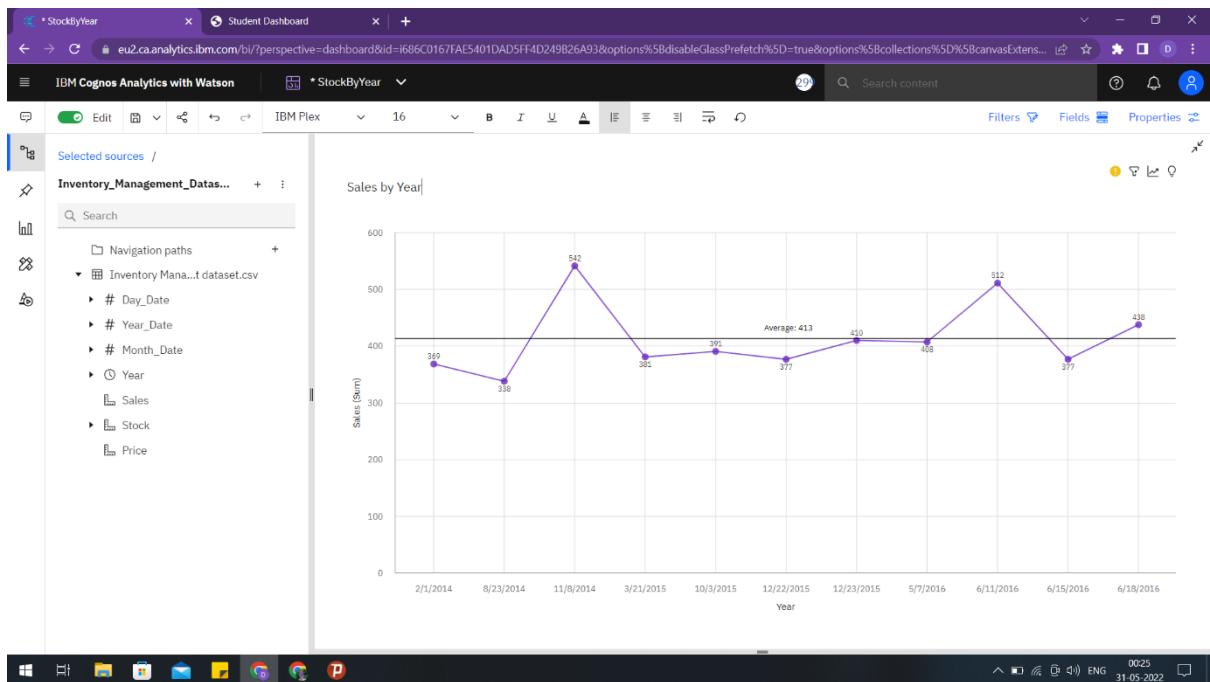
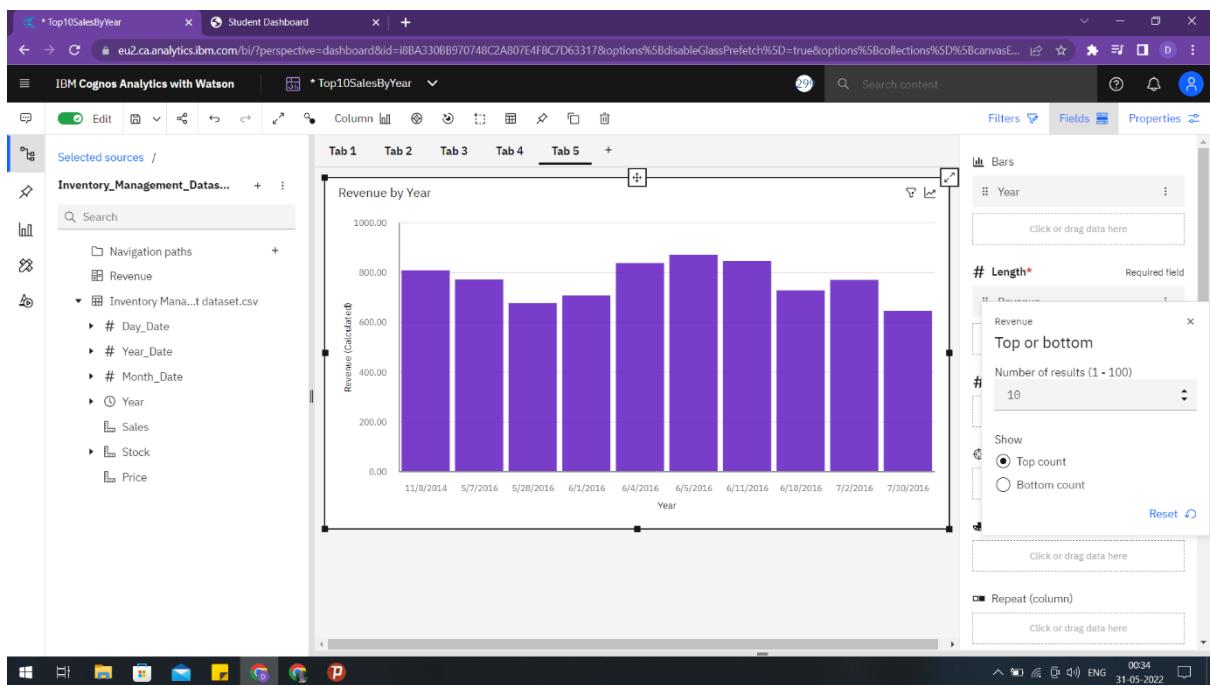
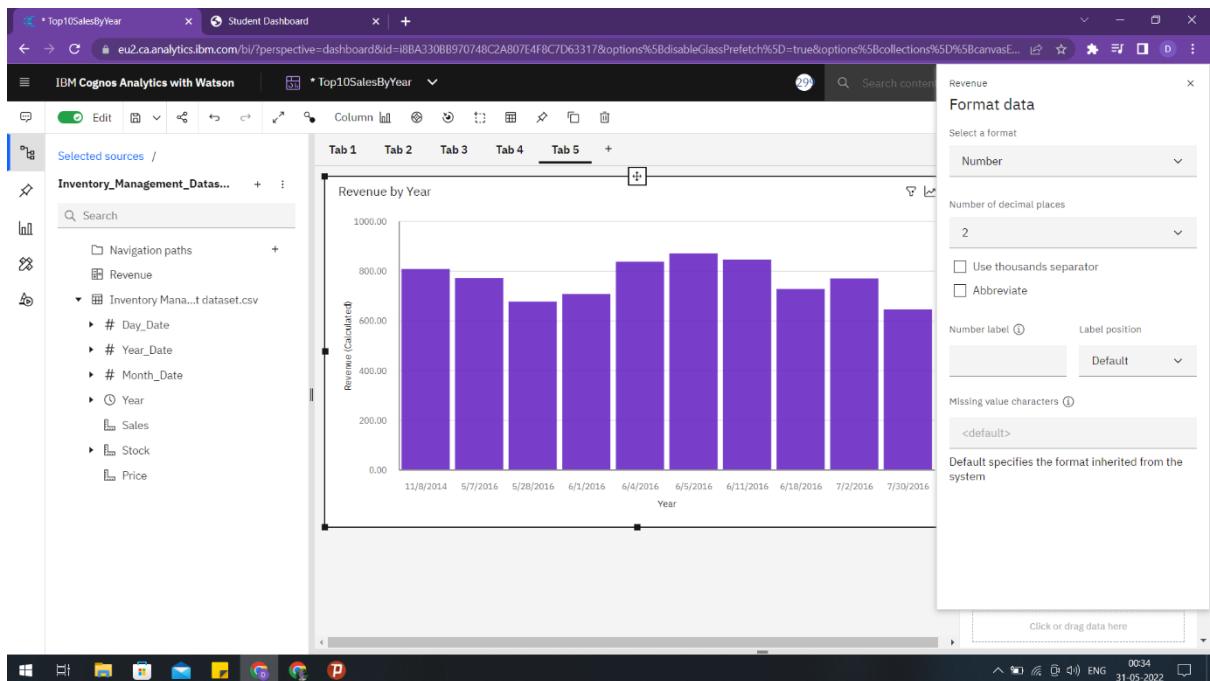
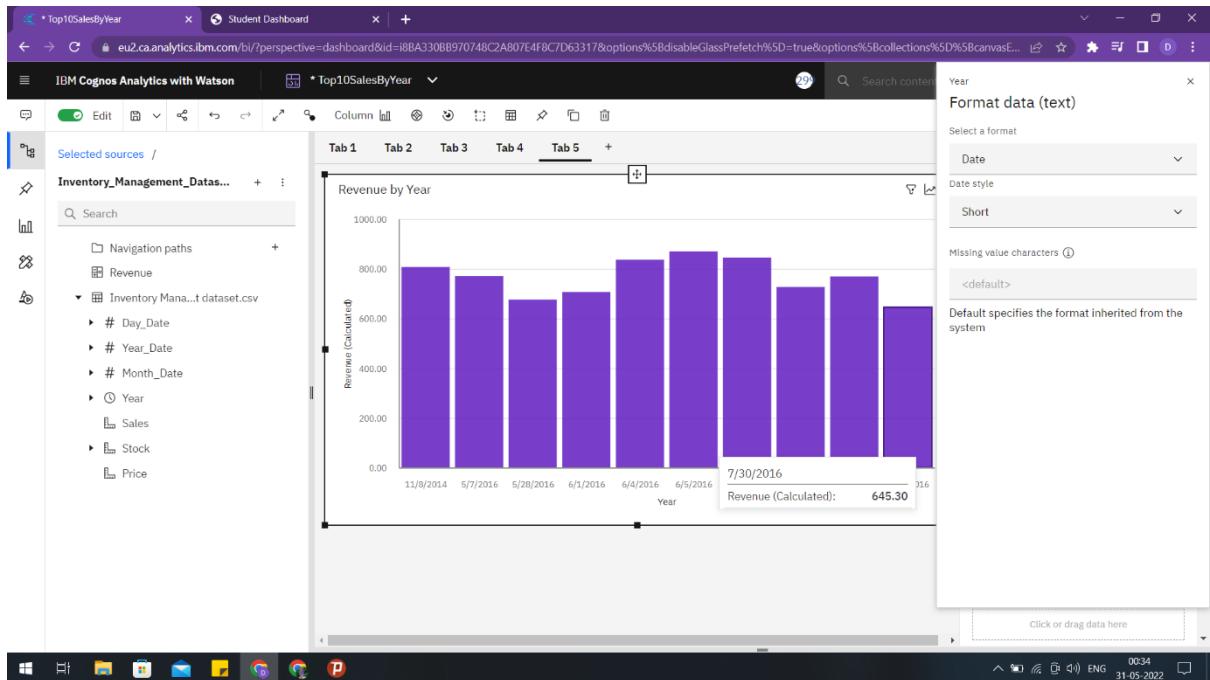


Fig: sales by year





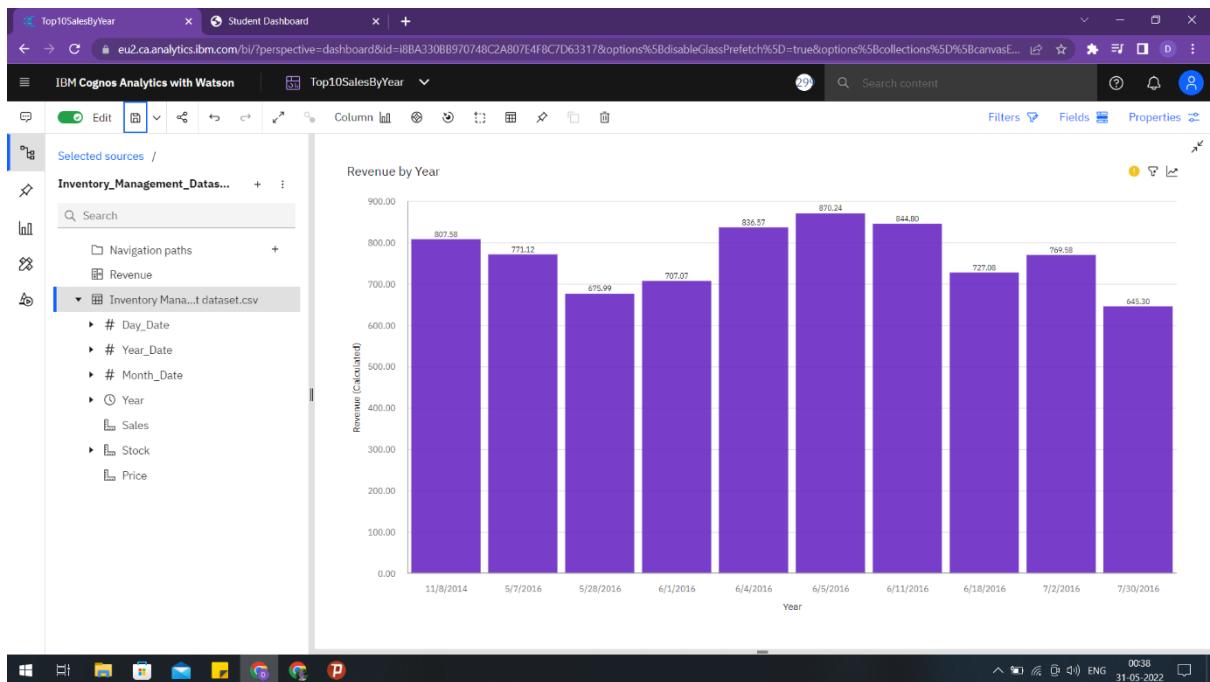
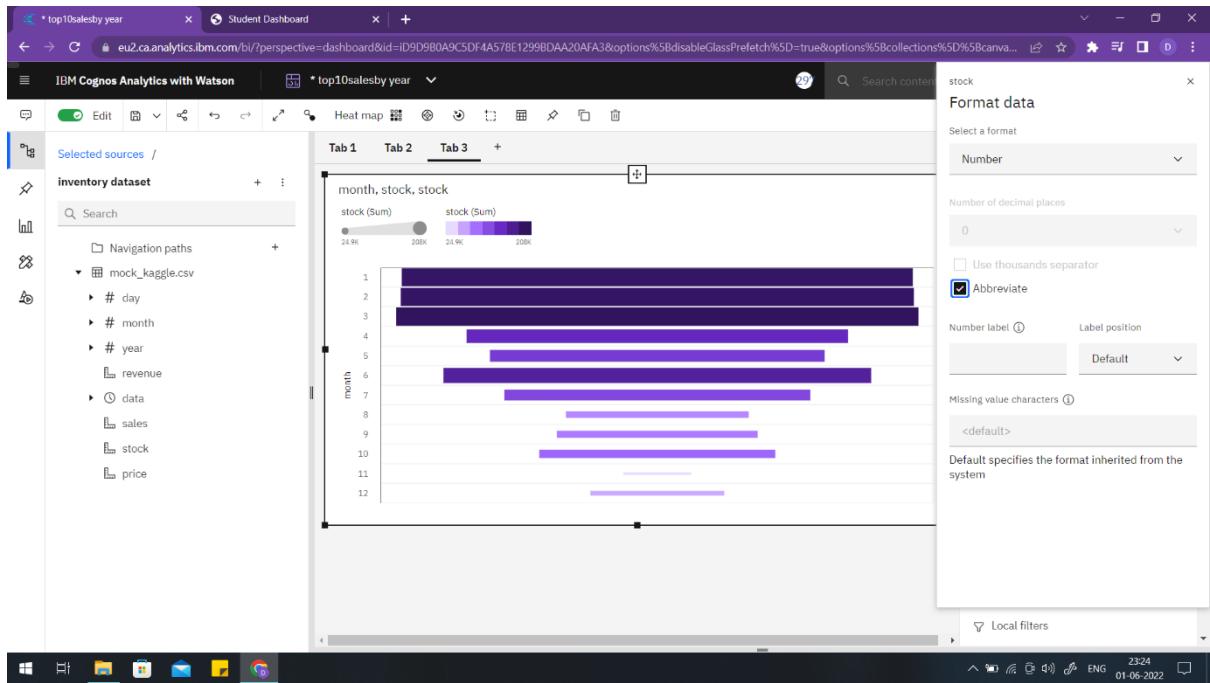


Fig: revenue by year



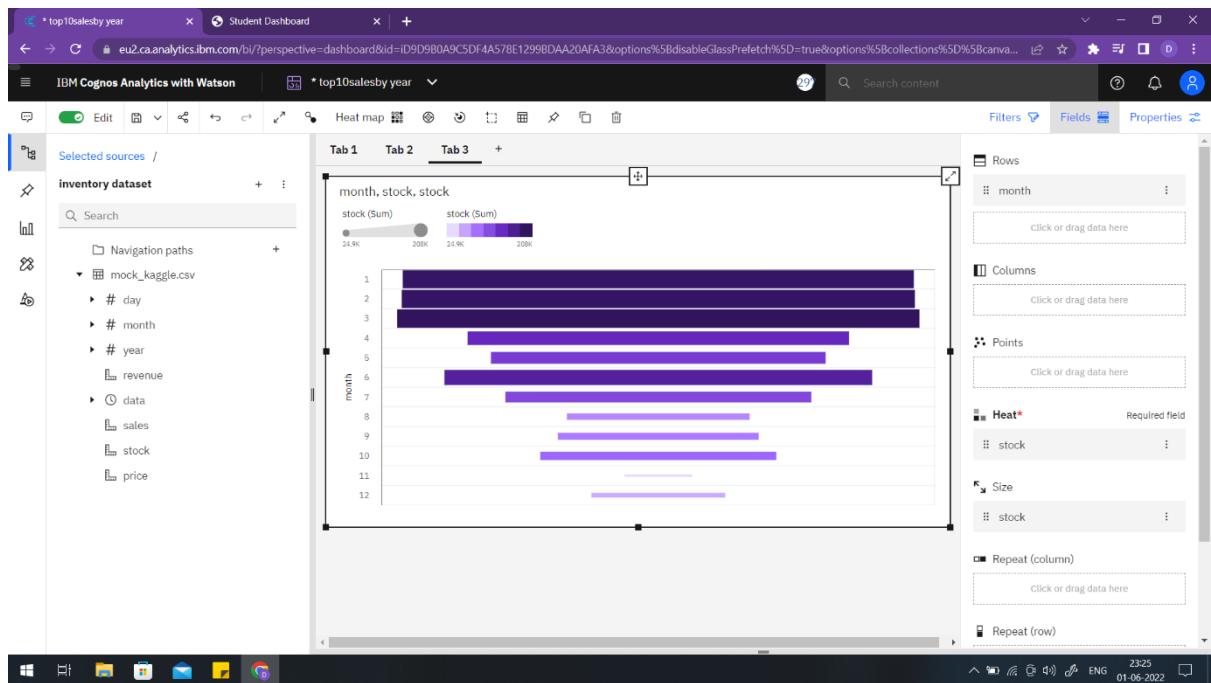
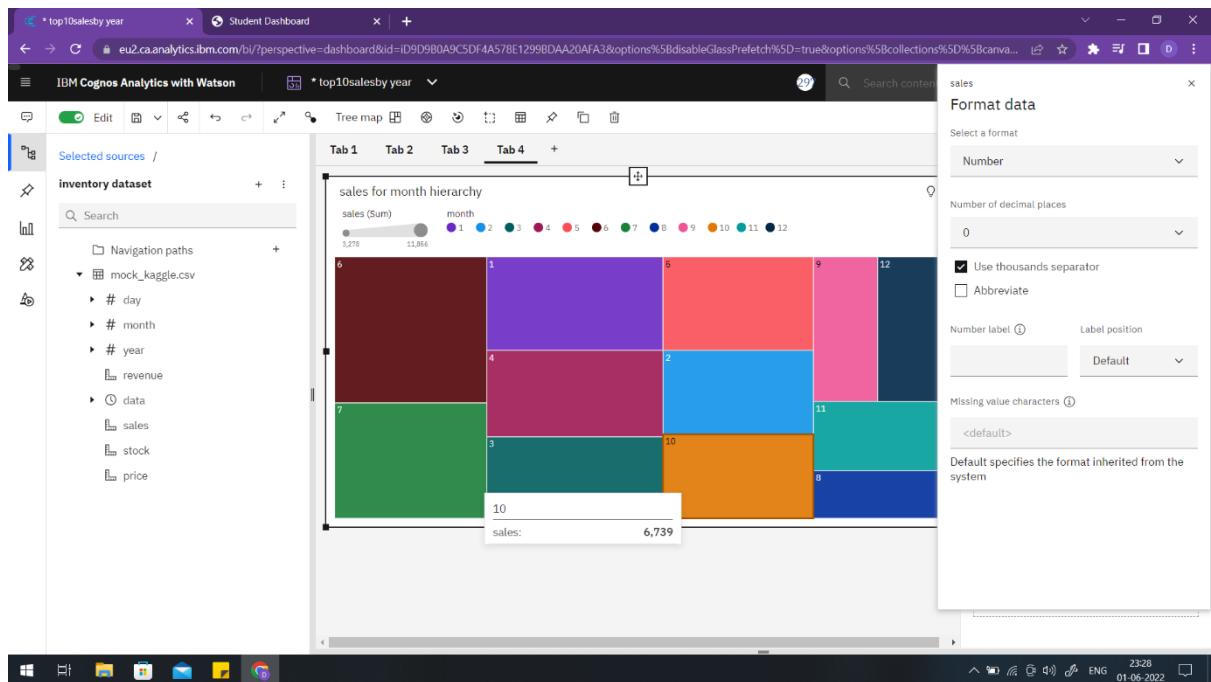


Fig: sales by month using heat map



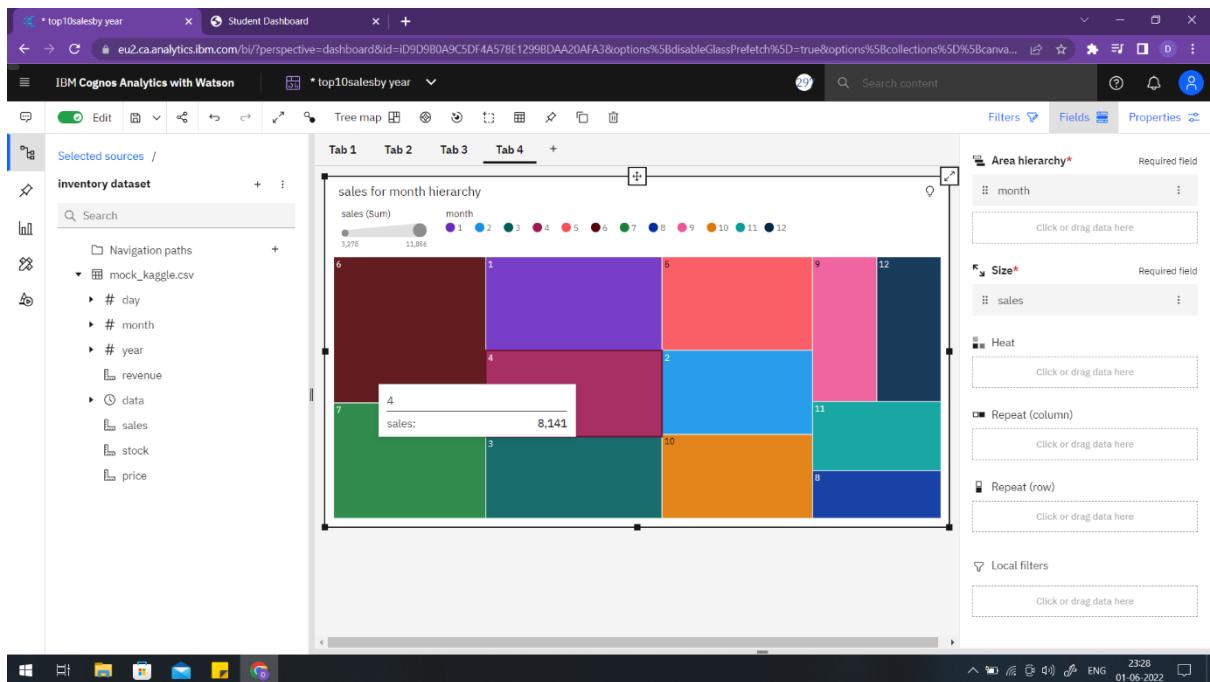
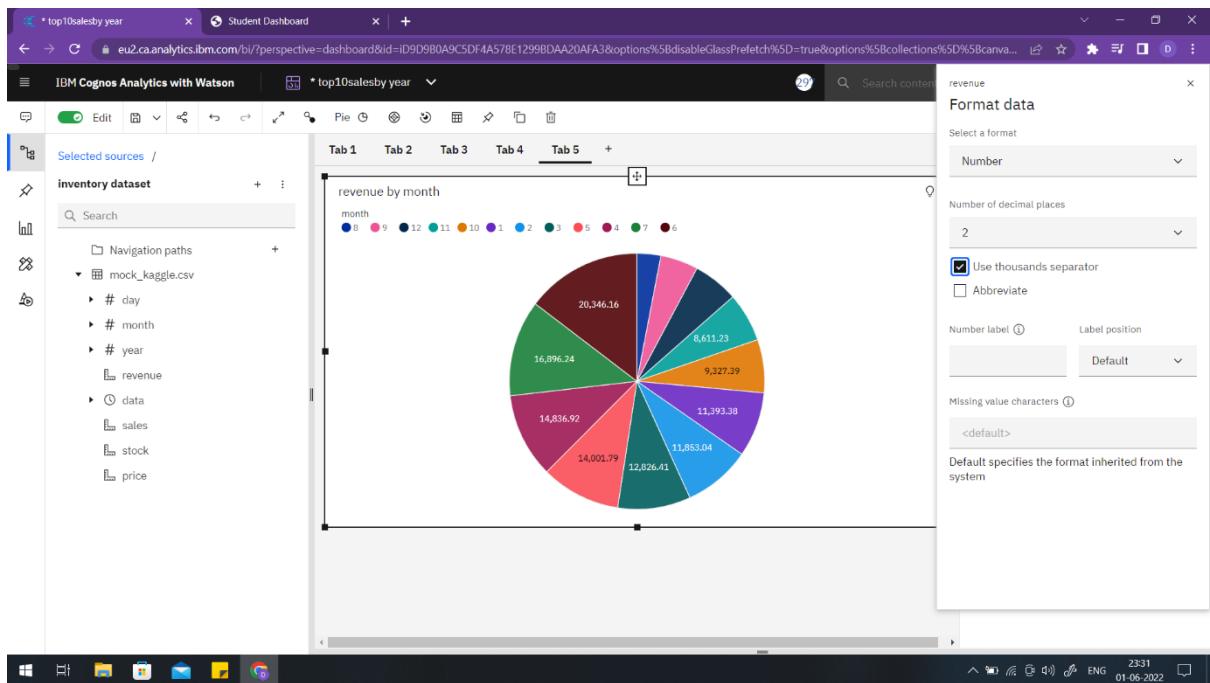


Fig: sales by month



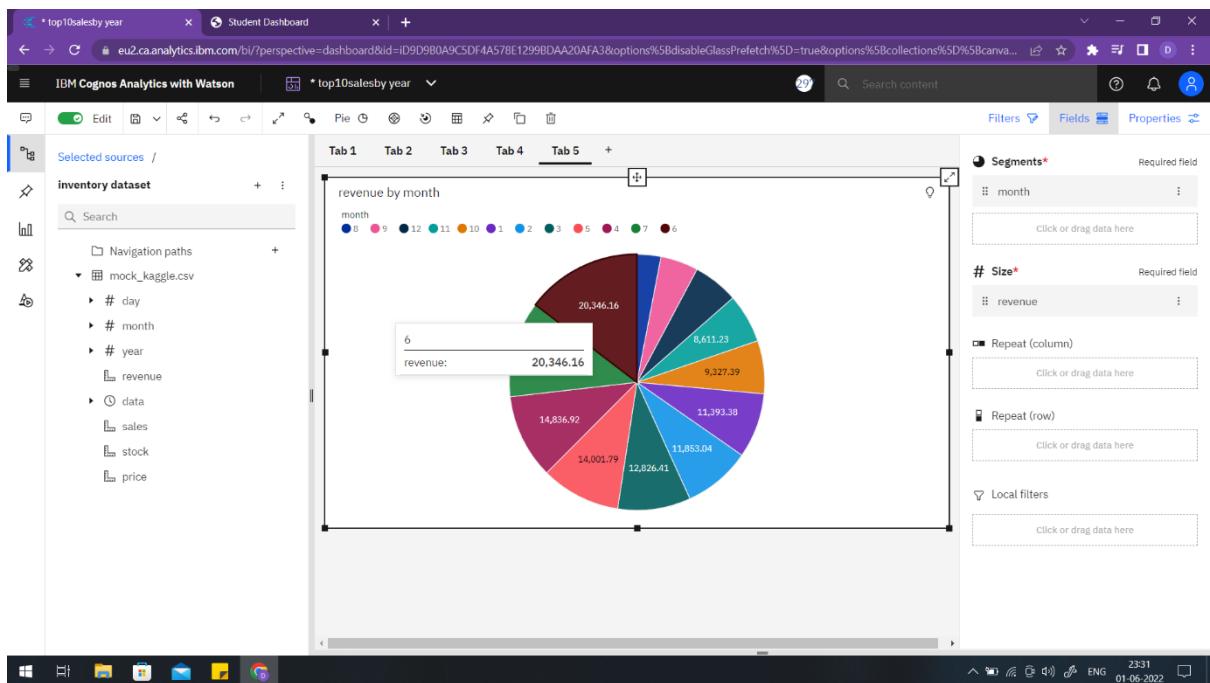
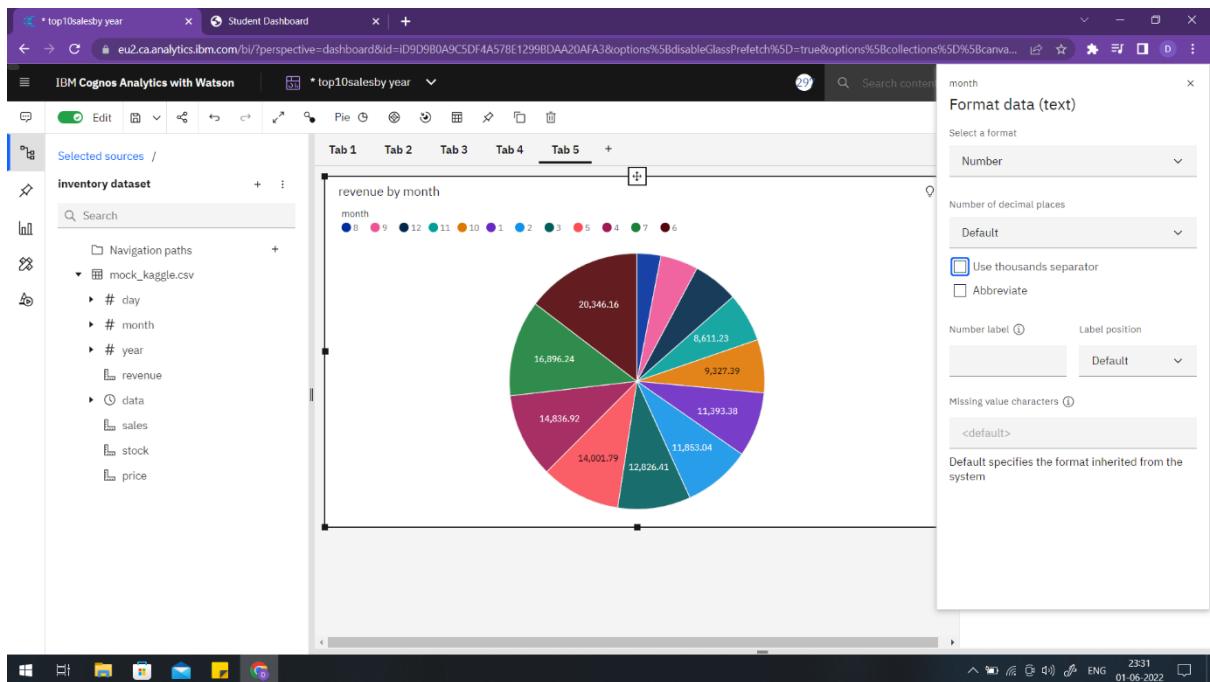


Fig: revenue by month

Summary:

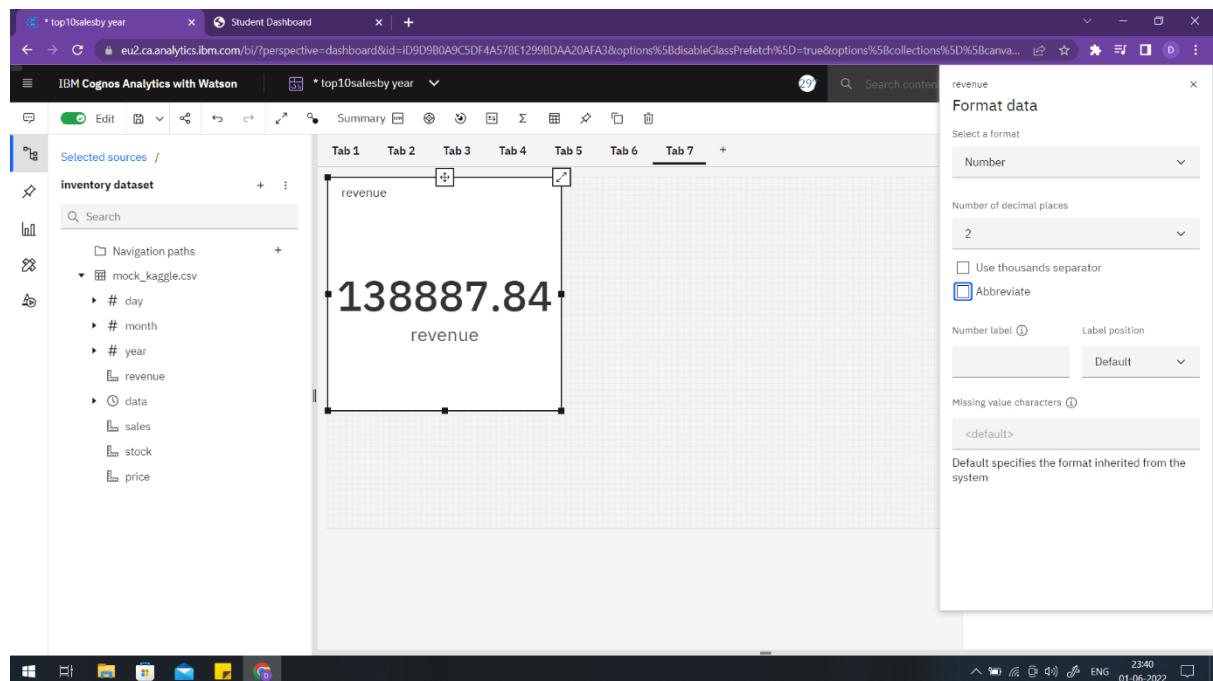


Fig: Revenue

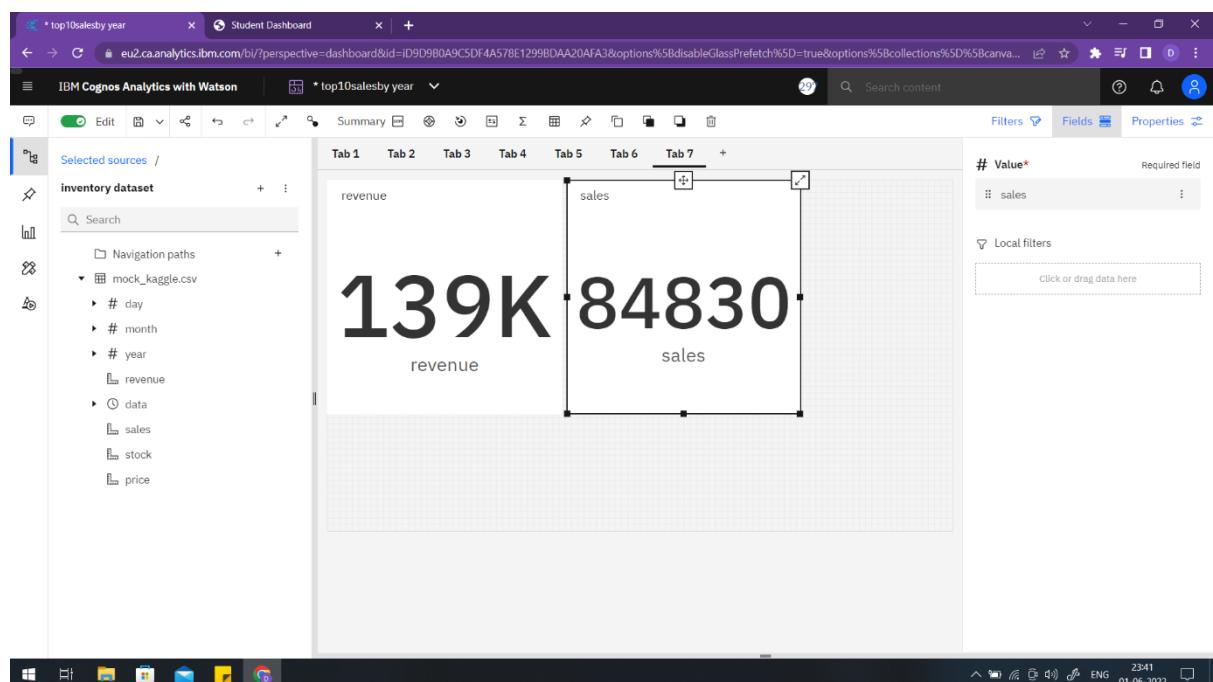


Fig: sales

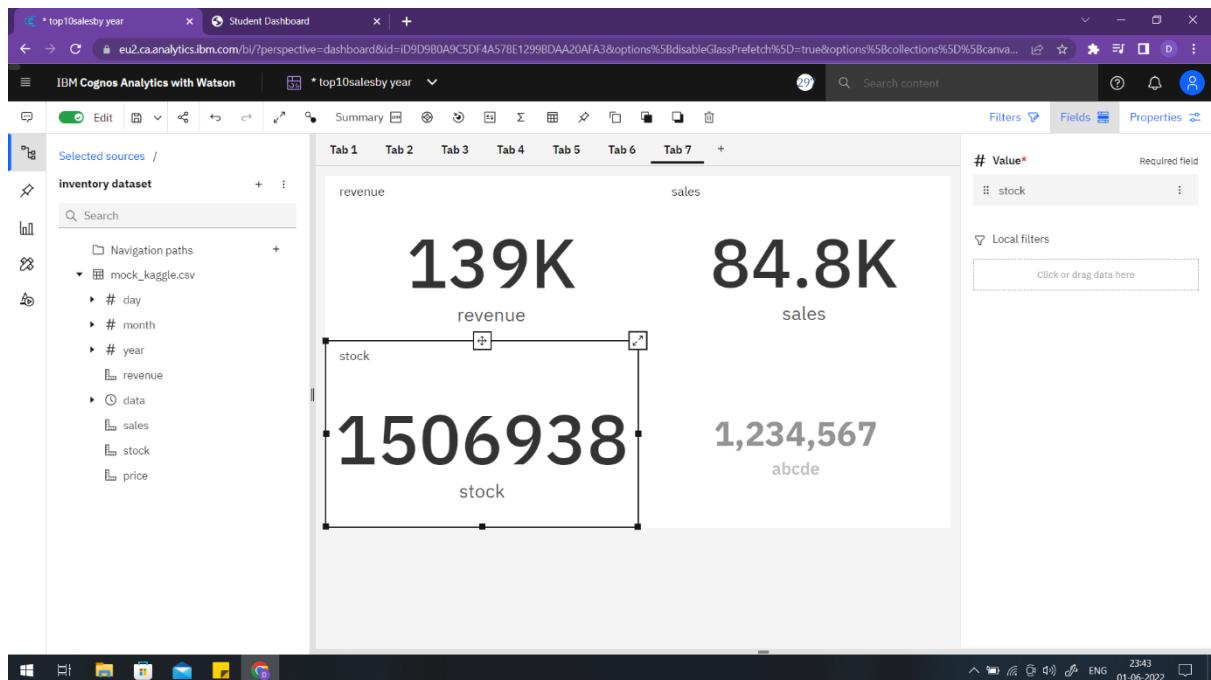


Fig: stock

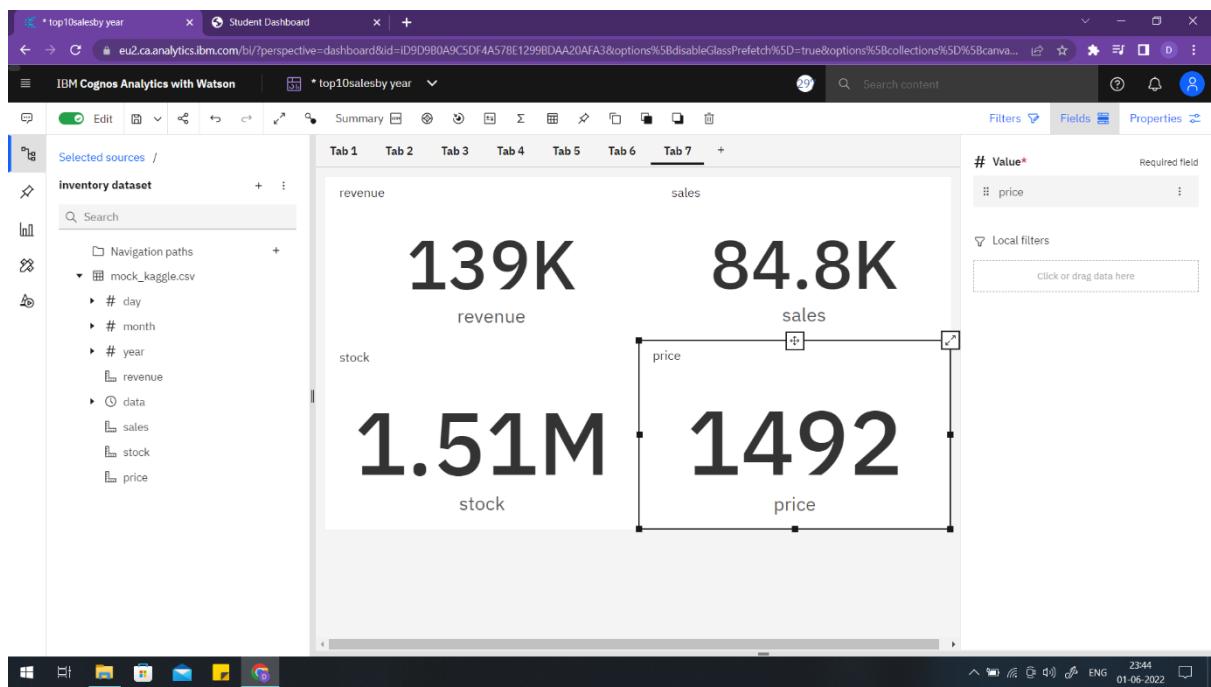


Fig: Price

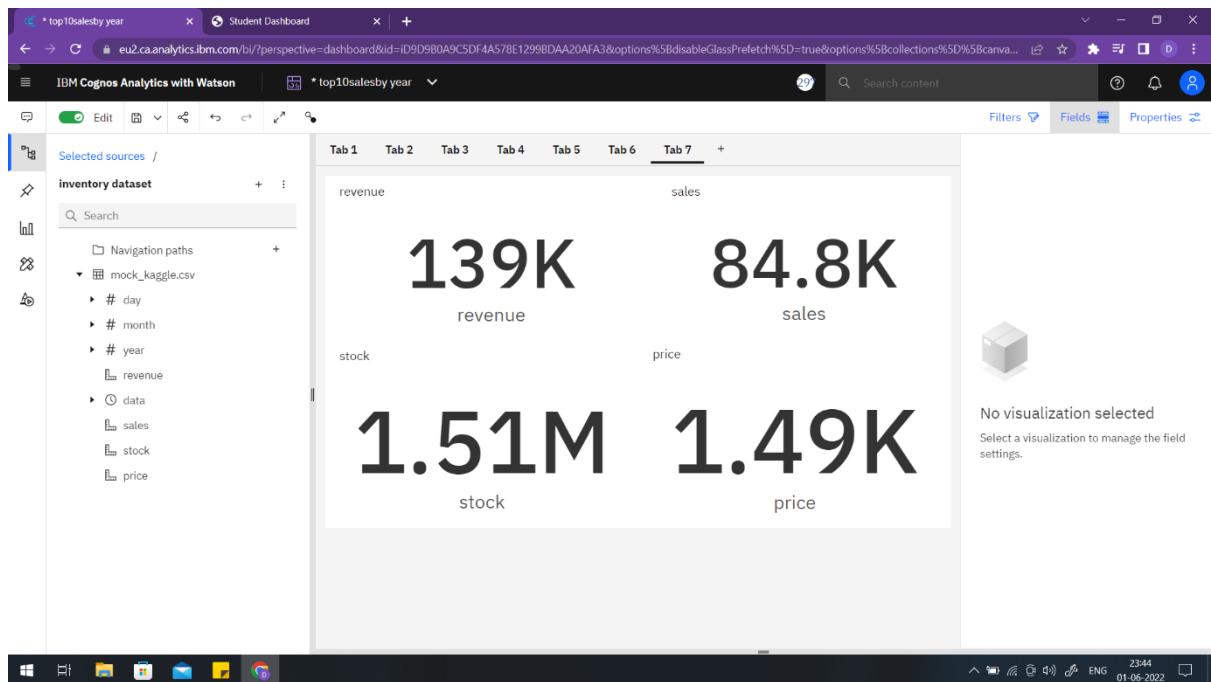


Fig: summary of revenue, sales, stock, price

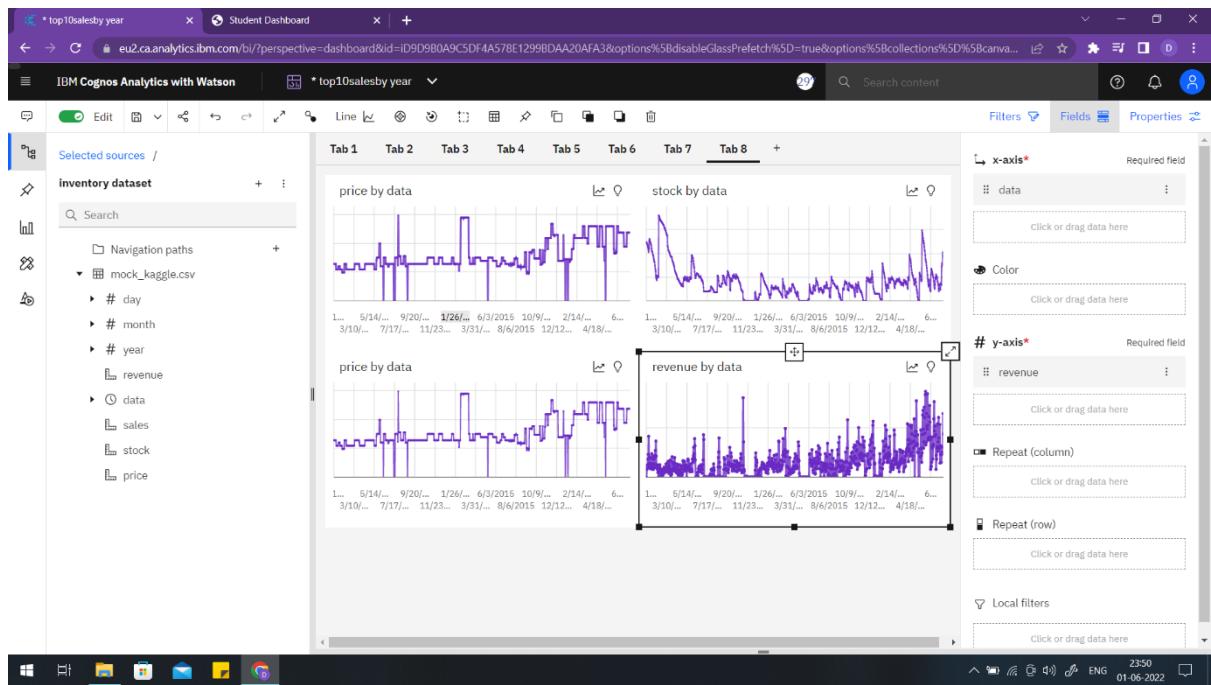


Fig: line chart for price, stock, price, revenue by year