University of Greenwich
Supermarket sales project

Class GCS1005A

Subject: 1641 - BI

Group 8

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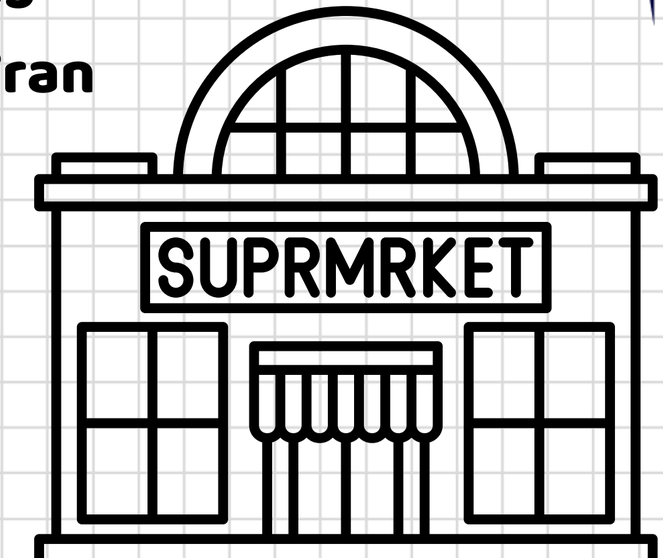

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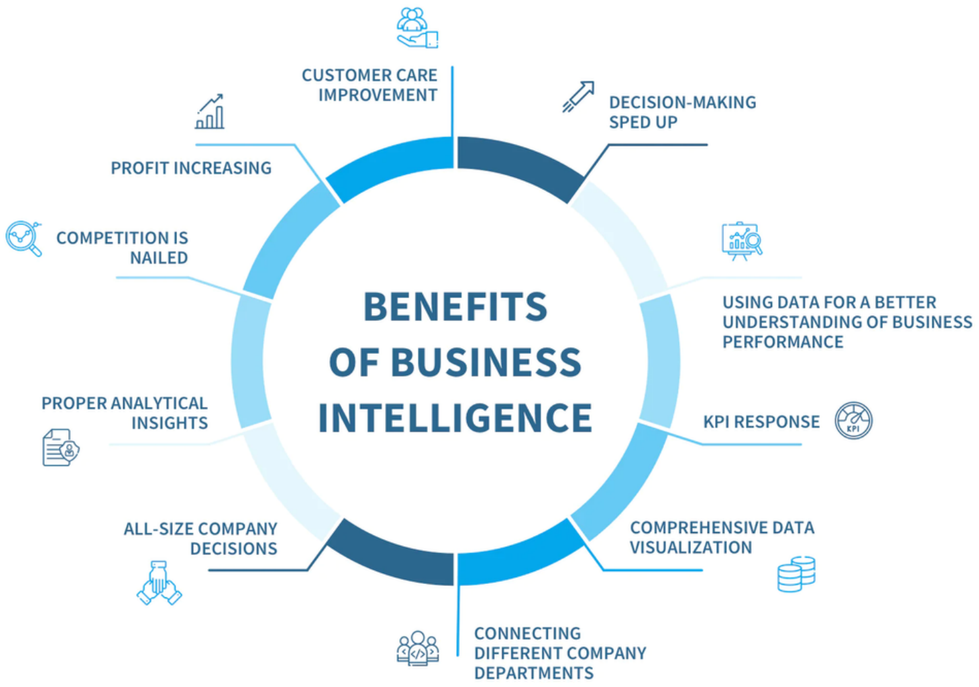
01 Business intelligence

Definition: Business Intelligence (BI) is a term that describes the process of collecting, analyzing, and visualizing data to make better business decisions. It involves tools and techniques to turn raw data into actionable insights.

Benefits of business intelligence (BI) :
Decision-making, improved efficiency, enhanced customer insights, competitive advantage, data accuracy, real-time reporting, forecasting, compliance, resource allocation, agility, collaboration, and historical analysis.



01 Real examples of how to apply BI on business

Cementos Argos, a Colombian cement and concrete producer, is a real-world example of how Business Intelligence (BI) can significantly improve financial efficiency. Cementos Argos leveraged BI tools and techniques to optimize various aspects of their financial operations.

How Cementos Argos uses BI: Cementos Argos has used Business Intelligence to cut costs, increase revenue and manage cash flow effectively, improving financial performance in the construction industry. This real-life case highlights the real-world use of BI in finance.

02 General about tools and techniques of BI

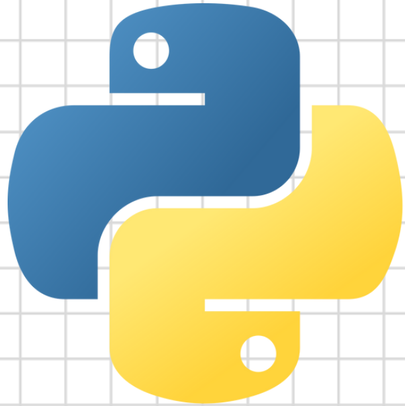
BI Tools

Tableau

Users may turn unstructured data into interactive and aesthetically pleasing insights with Tableau, a robust data visualization and business intelligence (BI) application.

Power BI

A robust business intelligence (BI) and data visualization tool created by Microsoft is called Power BI. It enables businesses and people to analyze data, produce interactive reports and dashboards, and share insights to help them make wise decisions.



Python

Python programming language is used to manipulate and analyze data

02 General about tools and techniques of BI

BI Techniques

Collection technique

- Data cleansing is the process of improving data quality by identifying and fixing errors and inconsistencies, which is vital for accurate analysis and effective decision-making.

- Data labeling, or data annotation, involves adding meaningful labels to data, especially in supervised machine learning, to train models for tasks like classification, object identification, and sentiment analysis.

Analysis technique.

- BI reports offer structured data through tables, charts, and text, aiding in tracking performance, trend-spotting, and data-driven decisions, generated regularly or as needed.

- Queries in business intelligence extract specific data subsets from databases, offering dynamic filtering and sorting. They use query tools to find answers, patterns, and data relationships.

- BI dashboards provide quick insights with dynamic visuals and KPIs. Tools like Tableau, Power BI, and QlikView are popular for creating interactive dashboards.

Analytic technique.

- Regression is a statistical technique for predicting one variable based on others, commonly used in analyzing business data like sales, pricing, and more.

- Machine Learning is a data analysis technique using computers to learn from data, categorize information, predict outcomes, and identify patterns, often applied to analyze customer, product, and business activity data.

03 Dataset and Dashboard

Dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total	Date	Time	Payment	cogs	gross margin percentage	gross income	Rating
2	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715	1/5/2019	13:08	Ewallet	522.83	4.761904762	26.1415	9.1
3	226-31-3081	C	Naypyitaw	Normal	Female	Electronic device	15.28	5	3.82	80.22	3/8/2019	10:29	Cash	76.4	4.761904762	3.82	9.6
4	631-41-3108	A	Yangon	Normal	Male	Electronic device	46.33	7	16.2155	340.5255	3/3/2019	13:23	Credit card	324.31	4.761904762	16.2155	7.4
5	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.288	489.048	1/27/2019	20:33	Ewallet	465.76	4.761904762	23.288	8.4
6	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.3785	2/8/2019	10:37	Ewallet	604.17	4.761904762	30.2085	5.3
7	699-14-3026	C	Naypyitaw	Normal	Male	Electronic accessories	85.39	7	29.8865	627.6165	3/25/2019	18:30	Ewallet	597.73	4.761904762	29.8865	4.1
8	355-53-5943	A	Yangon	Member	Female	Electronic accessories	68.84	6	20.652	433.692	2/25/2019	14:36	Ewallet	413.04	4.761904762	20.652	5.8
9	315-22-5665	C	Naypyitaw	Normal	Female	Home and lifestyle	73.56	10	36.78	772.38	2/24/2019	11:38	Ewallet	735.6	4.761904762	36.78	8
10	665-32-9167	A	Yangon	Member	Female	Electronic device	36.26	2	3.626	76.146	1/10/2019	17:15	Credit card	72.52	4.761904762	3.626	7.2
11	692-92-5582	B	Mandalay	Member	Female	Food and beverages	54.84	3	8.226	172.746	2/20/2019	13:27	Credit card	164.52	4.761904762	8.226	5.9
12	351-62-0822	B	Mandalay	Member	Female	Electronic device	14.48	4	2.896	60.816	2/6/2019	18:07	Ewallet	57.92	4.761904762	2.896	4.5
13	529-56-3974	B	Mandalay	Member	Male	Electronic accessories	25.51	4	5.102	107.142	3/9/2019	17:03	Cash	102.04	4.761904762	5.102	6.8
14	365-64-0515	A	Yangon	Normal	Female	Electronic device	46.95	5	11.7375	246.4875	2/12/2019	10:25	Ewallet	234.75	4.761904762	11.7375	7.1
15	252-56-2699	A	Yangon	Normal	Male	Food and beverages	43.19	10	21.595	453.495	2/7/2019	16:48	Ewallet	431.9	4.761904762	21.595	8.2
16	829-34-3910	A	Yangon	Normal	Female	Health and beauty	71.38	10	35.69	749.49	3/29/2019	19:21	Cash	713.8	4.761904762	35.69	5.7
17	299-46-1805	B	Mandalay	Member	Female	Electronic device	93.72	6	28.116	590.436	1/15/2019	16:19	Cash	562.32	4.761904762	28.116	4.5
18	656-95-9349	A	Yangon	Member	Female	Electronic device	68.93	7	24.1255	506.6355	3/11/2019	11:03	Credit card	482.51	4.761904762	24.1255	4.6
19	765-26-6951	A	Yangon	Normal	Male	Electronic device	72.61	6	21.783	457.443	1/1/2019	10:39	Credit card	435.66	4.761904762	21.783	6.9
20	329-62-1586	A	Yangon	Normal	Male	Electronic device	54.67	3	8.2005	172.2105	1/21/2019	18:00	Credit card	164.01	4.761904762	8.2005	8.6
21	319-50-3348	B	Mandalay	Normal	Female	Electronic device	40.3	2	4.03	84.63	3/11/2019	15:30	Ewallet	80.6	4.761904762	4.03	4.4
22	300-71-4605	C	Naypyitaw	Member	Male	Electronic device	86.04	5	21.51	451.71	2/25/2019	11:24	Ewallet	430.2	4.761904762	21.51	4.8
23	371-85-5789	B	Mandalay	Normal	Male	Electronic device	87.98	3	13.197	277.137	3/5/2019	10:40	Ewallet	263.94	4.761904762	13.197	5.1
24	273-16-6619	B	Mandalay	Normal	Male	Electronic device	33.2	2	3.32	69.72	3/15/2019	12:20	Credit card	66.4	4.761904762	3.32	4.4
25	636-48-8204	A	Yangon	Normal	Male	Electronic accessories	34.56	5	8.64	181.44	2/17/2019	11:15	Ewallet	172.8	4.761904762	8.64	9.9
26	549-59-1358	A	Yangon	Member	Male	Sports and travel	88.63	3	13.2945	279.1845	3/2/2019	17:36	Ewallet	265.89	4.761904762	13.2945	6
27	227-03-5010	A	Yangon	Member	Female	Home and lifestyle	52.59	8	21.036	441.756	3/22/2019	19:20	Credit card	420.72	4.761904762	21.036	8.5
28	649-29-6775	B	Mandalay	Normal	Male	Fashion accessories	33.52	1	1.676	35.196	2/8/2019	15:31	Cash	33.52	4.761904762	1.676	6.7
29	189-17-4241	A	Yangon	Normal	Female	Fashion accessories	87.67	2	8.767	184.107	3/10/2019	12:17	Credit card	175.34	4.761904762	8.767	7.7
30	145-94-9061	B	Mandalay	Normal	Female	Food and beverages	88.36	5	22.09	463.89	1/25/2019	19:48	Cash	441.8	4.761904762	22.09	9.6
31	848-62-7243	A	Yangon	Normal	Male	Health and beauty	24.89	9	11.2005	235.2105	3/15/2019	15:36	Cash	224.01	4.761904762	11.2005	7.4
32	871-79-8483	B	Mandalay	Normal	Male	Fashion accessories	94.13	5	23.5325	494.1825	2/25/2019	19:39	Credit card	470.65	4.761904762	23.5325	4.8

Our research dataset, "sales system" on Kaggle, comprises extensive customer data and multi-platform sales figures, providing valuable insights into the point of sale systems business.

03 Column to be used in dataset

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total	Date	Time	Payment	cogs	gross margin percentage	gross income	Rating
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715	1/5/2019	13:08	Ewallet	522.83	4.761905	26.1415	9.1
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic device	15.28	5	3.8200	80.2200	3/8/2019	10:29	Cash	76.40	4.761905	3.8200	9.6
2	631-41-3108	A	Yangon	Normal	Male	Electronic device	46.33	7	16.2155	340.5255	3/3/2019	13:23	Credit card	324.31	4.761905	16.2155	7.4
3	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.2880	489.0480	1/27/2019	20:33	Ewallet	465.76	4.761905	23.2880	8.4
4	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.3785	2/8/2019	10:37	Ewallet	604.17	4.761905	30.2085	5.3

03 Unique Values:

To determine the unique values in each column, we can iterate through the dataset and collect the distinct values for each column. Here are some examples of unique values in certain columns:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 17 columns):
 #   Column                   Non-Null Count  Dtype
---  ------                   --------------  -----
 0   Invoice ID               1000 non-null   object
 1   Branch                   1000 non-null   object
 2   City                     1000 non-null   object
 3   Customer type            1000 non-null   object
 4   Gender                   1000 non-null   object
 5   Product line             1000 non-null   object
 6   Unit price               1000 non-null   float64
 7   Quantity                 1000 non-null   int64
 8   Tax 5%                   1000 non-null   float64
 9   Total                    1000 non-null   float64
 10  Date                     1000 non-null   datetime64[ns]
 11  Time                     1000 non-null   object
 12  Payment                  1000 non-null   object
 13  cogs                     1000 non-null   float64
 14  gross margin percentage  1000 non-null   float64
 15  gross income             1000 non-null   float64
 16  Rating                   1000 non-null   float64
dtypes: datetime64[ns](1), float64(7), int64(1), object(8)
memory usage: 132.9+ KB
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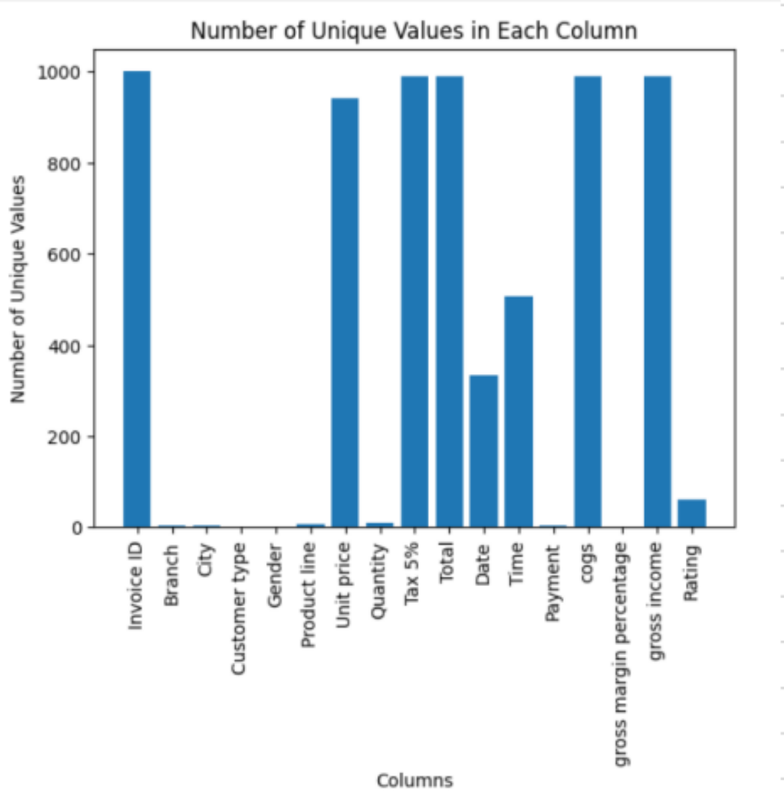
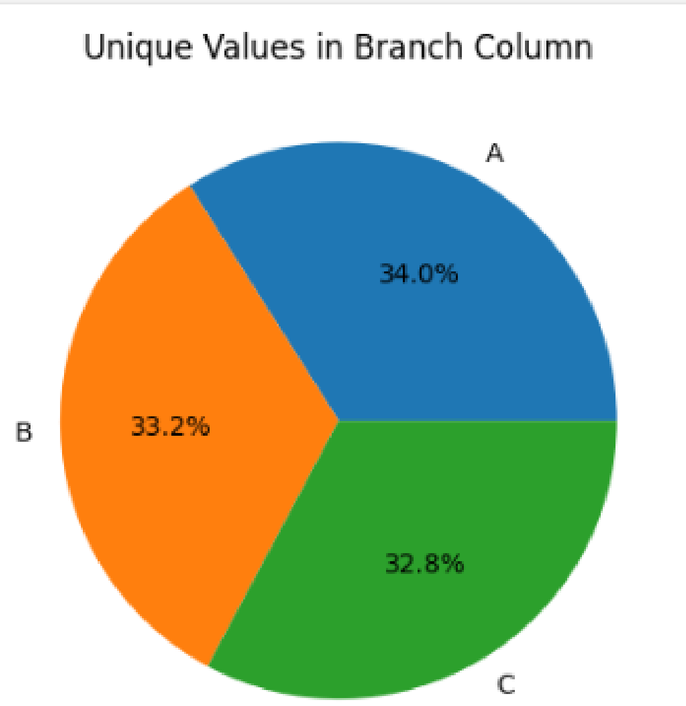
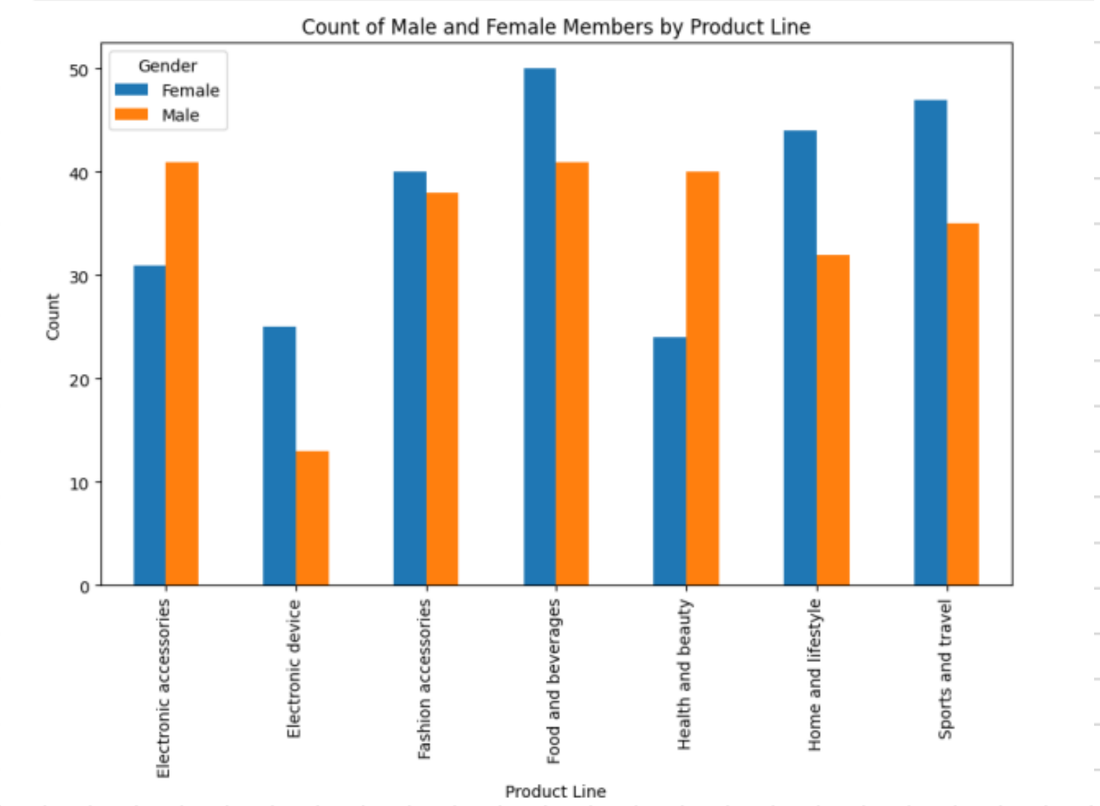




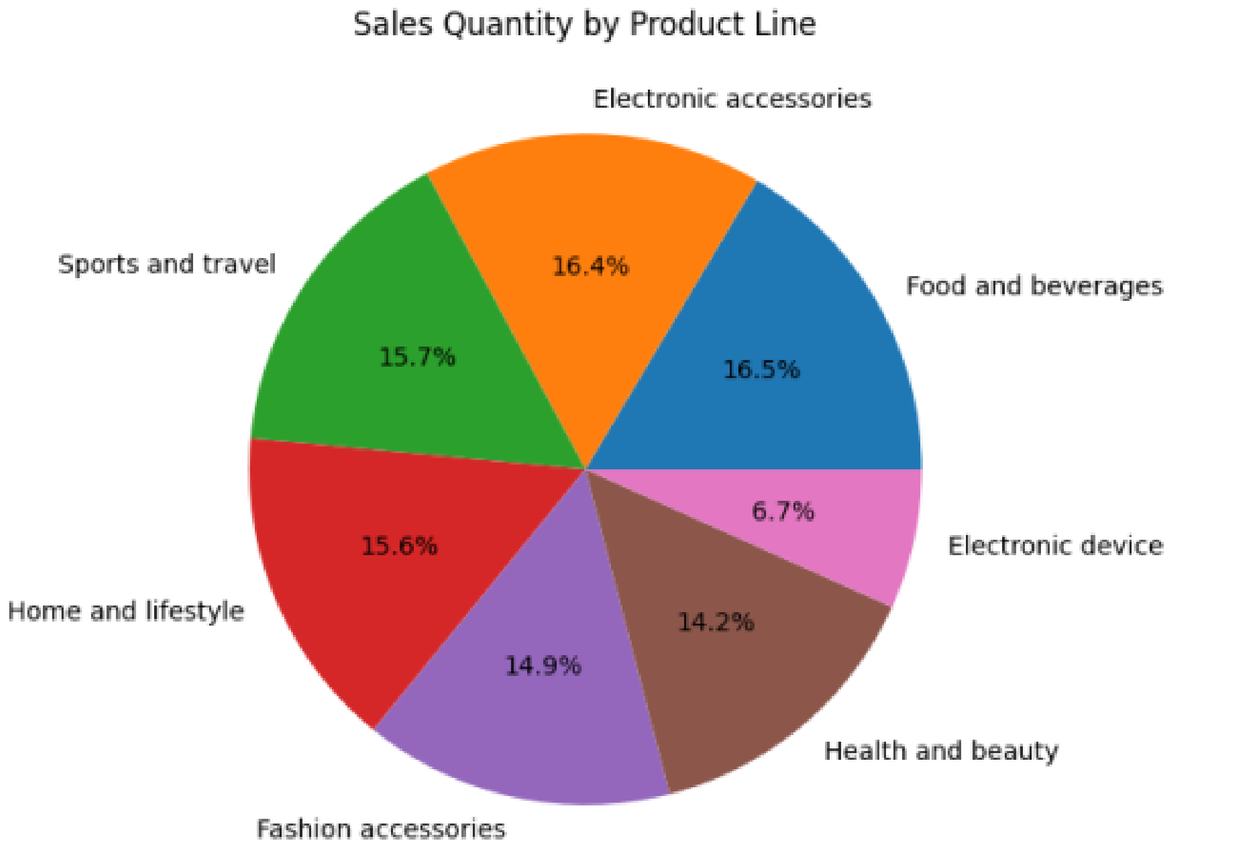
03 Total purchases of product line by customer type (gender)

Gender	Female	Male
Product line		
Electronic accessories	31	41
Electronic device	25	13
Fashion accessories	40	38
Food and beverages	50	41
Health and beauty	24	40
Home and lifestyle	44	32
Sports and travel	47	35



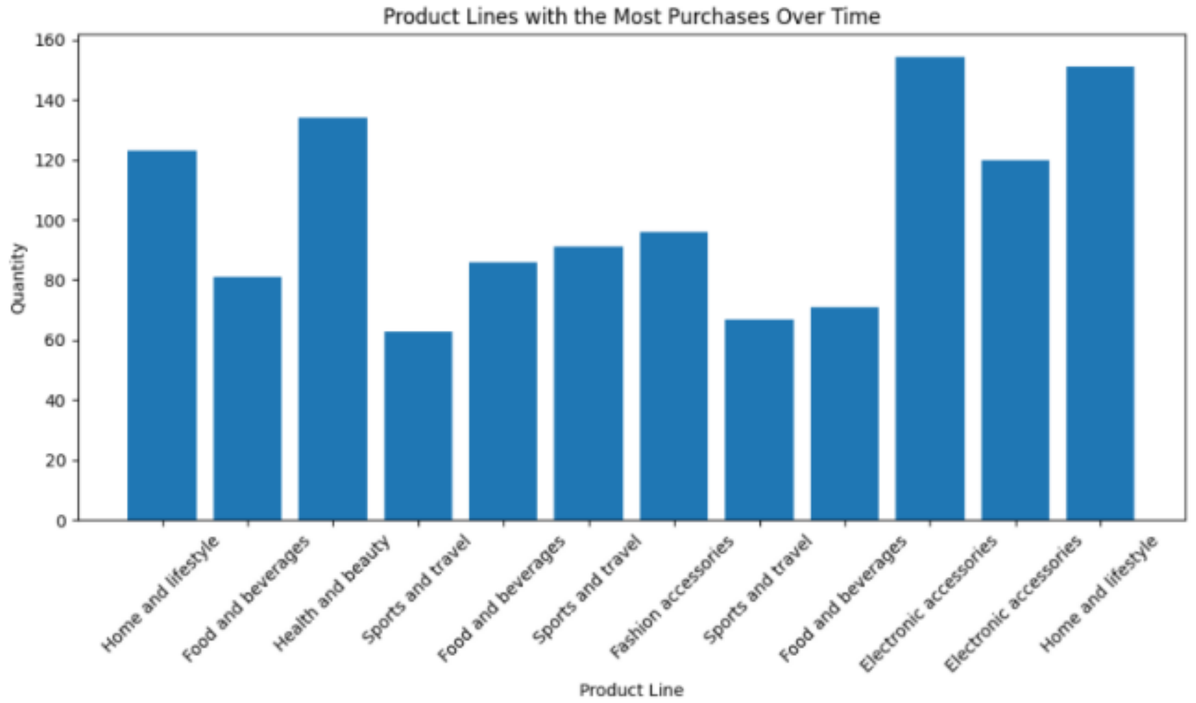
03 Product lines with the highest purchases

	Product line	Quantity
3	Food and beverages	907
0	Electronic accessories	901
6	Sports and travel	866
5	Home and lifestyle	860
2	Fashion accessories	821
4	Health and beauty	784
1	Electronic device	371



03 Statistics on product lines with the most purchases over time and bar chart

	Year	Month	Product line	Quantity
5	2019	1	Home and lifestyle	123
10	2019	2	Food and beverages	81
18	2019	3	Health and beauty	134
27	2020	1	Sports and travel	63
31	2020	2	Food and beverages	86
41	2020	3	Sports and travel	91
44	2021	1	Fashion accessories	96
55	2021	2	Sports and travel	67
59	2021	3	Food and beverages	71
63	2022	1	Electronic accessories	154
70	2022	2	Electronic accessories	120
82	2022	3	Home and lifestyle	151

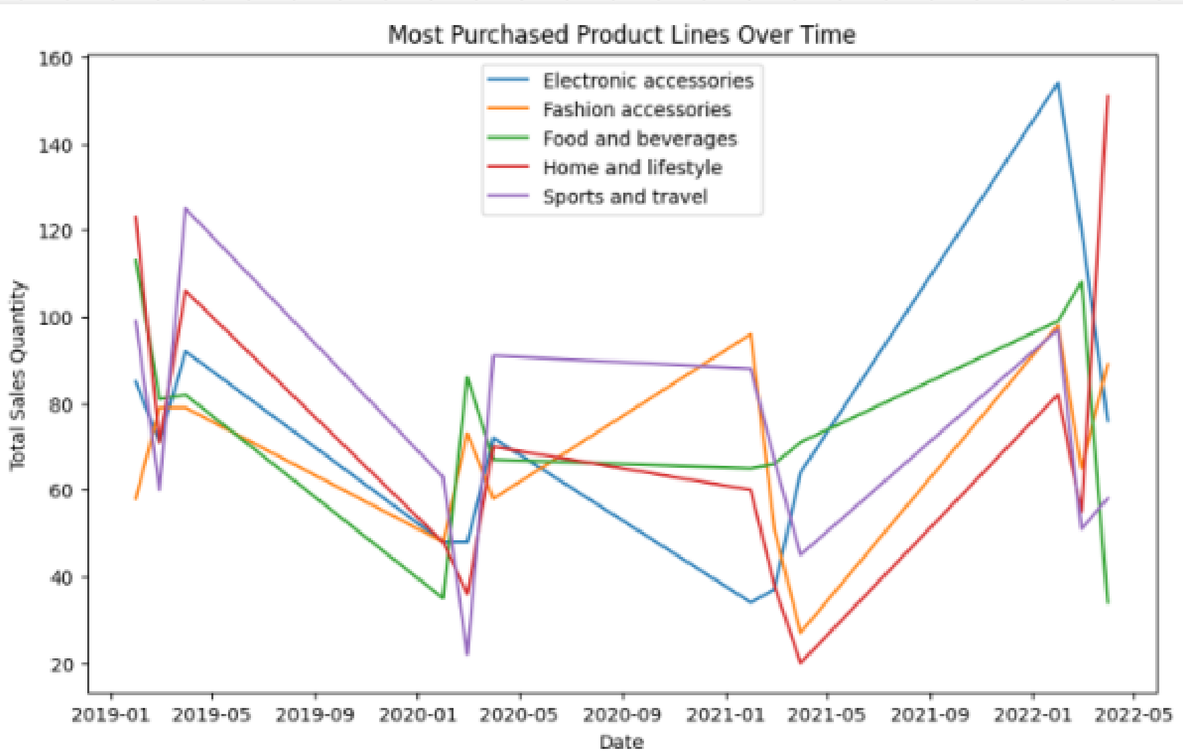


03 Pivot table and line chart to display the statistical data

Date	2019-01-31	2019-02-28	2019-03-31	2020-01-31
Product line				
Electronic accessories	85	71	92	48
Fashion accessories	58	79	79	48
Food and beverages	113	81	82	35
Home and lifestyle	123	71	106	48
Sports and travel	99	60	125	63

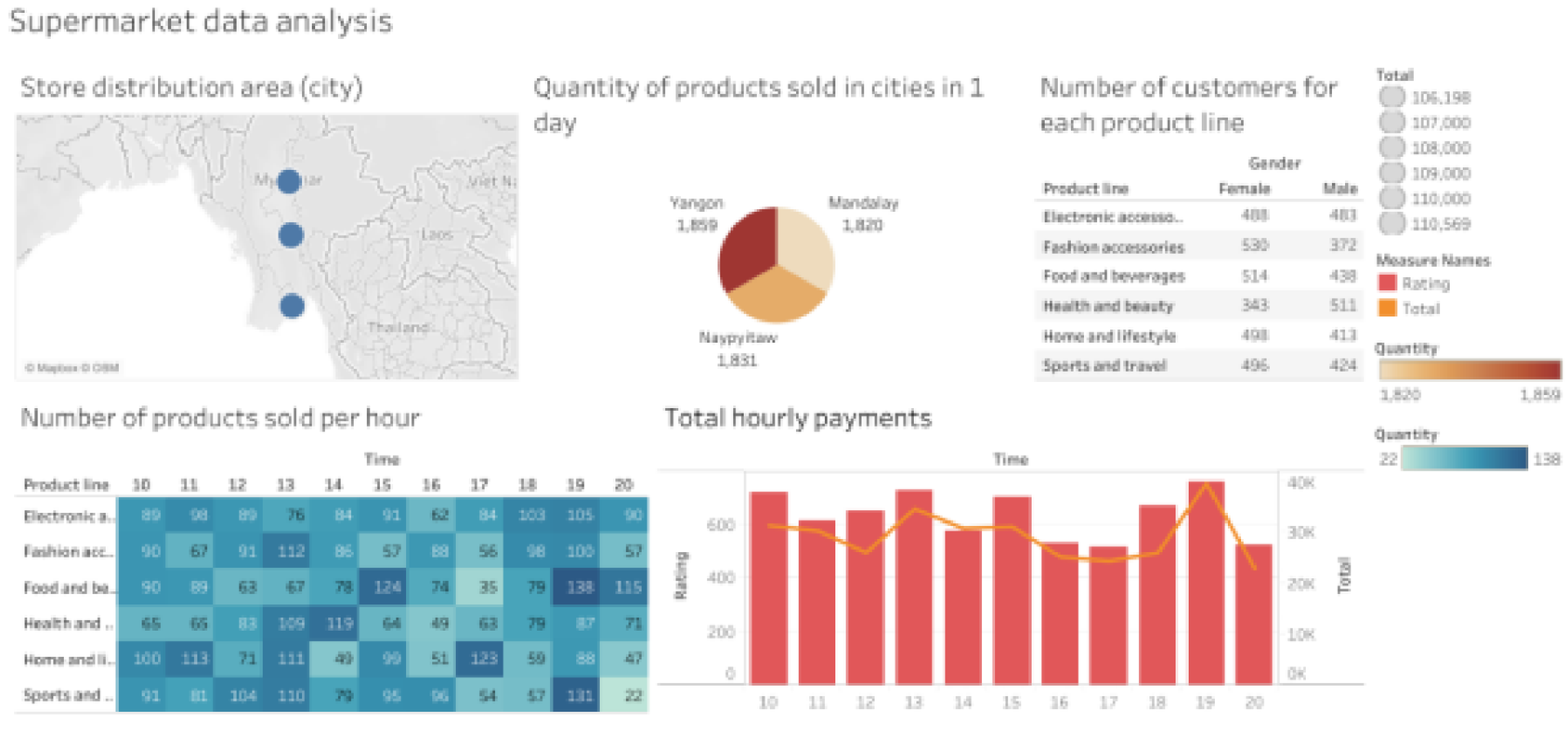
Date	2020-02-29	2020-03-31	2021-01-31	2021-02-28
Product line				
Electronic accessories	48	72	34	37
Fashion accessories	73	58	96	51
Food and beverages	86	67	65	66
Home and lifestyle	36	70	60	38
Sports and travel	22	91	88	67

Date	2021-03-31	2022-01-31	2022-02-28	2022-03-31
Product line				
Electronic accessories	64	154	120	76
Fashion accessories	27	98	65	89
Food and beverages	71	99	108	34
Home and lifestyle	20	82	55	151
Sports and travel	45	97	51	58



03 Dataset and Dashboard

Dashboard



04 Point of view.

Discuss how BI tools can contribute to effective decision-making

BI technologies empower companies to access data, visualize information, and gain data-driven insights for improved decision-making. This leads to increased efficiency, reduced risks, better resource allocation, and ultimately, business success and growth.

Data aggregation and consolidation

Data aggregation and consolidation in BI involve gathering data from various sources for analysis and reporting.

For example, a retailer with physical stores and an online presence uses real-time data collection to optimize inventory levels and working capital by monitoring stock across all channels.

Data Visualization

Data visualization uses graphics, like charts and graphs, to make data more accessible and understandable. It helps uncover trends and insights that raw data may not reveal.

For instance, a global health organization uses data visualization to track and understand COVID-19's impact, providing real-time information for informed decision-making.

Real-Time Reporting

Real-time BI reporting involves creating and delivering instant data visualizations, dashboards, and reports for users to monitor and make data-driven decisions as events unfold.

For instance, a retailer employing Microsoft Power BI uses real-time data to track inventory, optimize restocking, and adjust production and marketing strategies promptly to meet demand and boost sales.

04 Point of view.

Legal issues involved in exploiting user data for business intelligence

Data Privacy Regulations

GDPR requires enterprises in the European Union to seek express consent from individuals before collecting and processing their personal data. In addition, it requires data protection impact evaluations and the hiring of data protection officers.

Data Consent and Transparency

I Before collecting and processing data from users, businesses must seek their informed consent.Transparency requires clear and widely available privacy policies and terms of service.

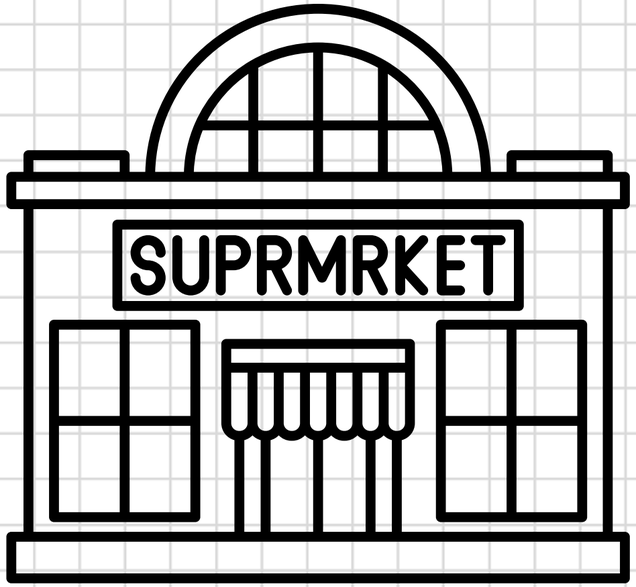
Data Security

Legal obligations mandate data protection against breaches and unauthorized access. Security measures, like encryption and access controls, are necessary to safeguard sensitive data.

Data Minimization

Organizations should collect only the data necessary for their intended business intelligence purposes.Over-collection of user data could lead to legal complications and privacy violations.

Thank you for your attentive listening



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BTEC

Higher Nationals in Computing

Business Intelligence

ASSIGNMENT 2

Learner's name: NguyenLe Minh Thanh–GCS210087

Le Thai Trung Tin–GCS210085

Class: GCS1005A

Subject code: 1641

Assessor name: **Le Tran Ngoc Tran**

Assignment due: 10/21/2023 Assignment submitted: 10/26/2023

ASSIGNMENT 2 FRONT SHEET

Qualification	**BTEC Level 5 HND Diploma in Computing**		
Unit number and title	Unit 14: Business Intelligence		
Submission date		**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	
Student Name	NguyenLe Minh Thanh– GCS210087 Le Thai Trung Tin– GCS210085	**Student ID**	Group 8
Class	GCS1005A	**Assessor name**	Le Tran Ngoc Tran
Student declaration I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			
		Student's signature	

Grading grid

P3	P4	P5	P6	M3	M4	D3	D4

❒ **Summative Feedback:**		❒ **Resubmission Feedback:**
Grade:	**Assessor Signature:**	**Date:**
IV Signature:		

Assessment Brief

Student Name/ID Number	
Unit Number and Title	**14: Business Intelligence**
Academic Year	2018
Unit Tutor	
Assignment Title	**Assignment 2: Apply BI tools & techniques and their impact**
Issue Date	
Submission Date	
IV Name & Date	

Submission Format
Part I: Project submission. This should be a zip / rar folder of your project, including all necessary files to run your project. There should be a link to your Tableau work on Tableau Public cloud. Part II: The submission is in the form of a group written report. This should be written in a concise, formal business style using single spacing and font size 12. You are required to make use of headings, paragraphs and subsections as appropriate, and all work must be supported with research and referenced using the Harvard referencing system. Please also provide a bibliography using the Harvard referencing system. Part III: Team needs to present their point of view about how business intelligence tools can contribute to effective decision-making as well as the legal issues involved in exploiting user data for business intelligence. You may need to research for specific examples of organizations that use BI tools to enhance or improve their business and evaluate how they can use BI tools for extend their target audience and make them more competitive within the market.

Unit Learning Outcomes
LO3 Demonstrate the use of business intelligence tools and technologies

Assignment Brief
(Continued from previous scenario) Your next task is to demonstrate to the board of directors about the ability of applying business intelligence in the company's current business processes. To demonstrate BI, you need to prepare a presentation about BI and related tools & techniques and a demonstration on real company dataset. For the presentation, you need: - Explain general concept of what is BI - Introduction to some tools / techniques for BI and their application in general For the demonstration, you need: - A (some) data set(s) extracted from the company's business processes. Explain the dataset. - Show how you pre-process data for later analysis, explain each step and it purpose - Design dashboards to show your analysis on pre-processed data. Explain clearly purpose of dashboards and charts. Suggestions should be made after analysis During the demonstration, you need collect feed-back and comments from users to review how well your dashboards design meet user or business requirement and what customization needed for future use. Team needs to present their point of view about how business intelligence tools can contribute to effective decision-making as well as the legal issues involved in exploiting user data for business intelligence. You may need to research for specific examples of organizations that use BI tools to enhance or improve their business and evaluate how they can use BI tools for extend their target audience and make them more competitive within the market. To summary, you need to submit a report in PDF includes 4 parts: your presentation, result of demonstration and review of user feedback, point of view on BI contribution and legal issues.

Learning Outcomes and Assessment Criteria		
Pass	**Merit**	**Distinction**
LO3 Demonstrate the use of business intelligence tools and technologies		**D3** Provide a critical review of the design in terms of how it meets a specific user or business requirement and identify what customisation has been integrated into the design.
P3 Determine, with examples, what business intelligence is and the tools and techniques associated with it. **P4** Design a business intelligence tool, application or interface that can perform a specific task to support problem-solving or decision-making at an advanced level.	**M3** Customise the design to ensure that it is user friendly and has a functional interface.	
LO4 Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used		**D4** Evaluate how organisations could use business intelligence to extend their target audience and make them more competitive within the market, taking security legislation into consideration
P5 Discuss how business intelligence tools can contribute to effective decision-making. **P6** Explore the legal issues involved in the secure exploitation of business intelligence tools	**M4** Conduct research to identify specific examples of organisations that have used business intelligence tools to enhance or improve operations.	

Table of Contents

ASSIGNMENT 2 ANSWERS

I. General about BI

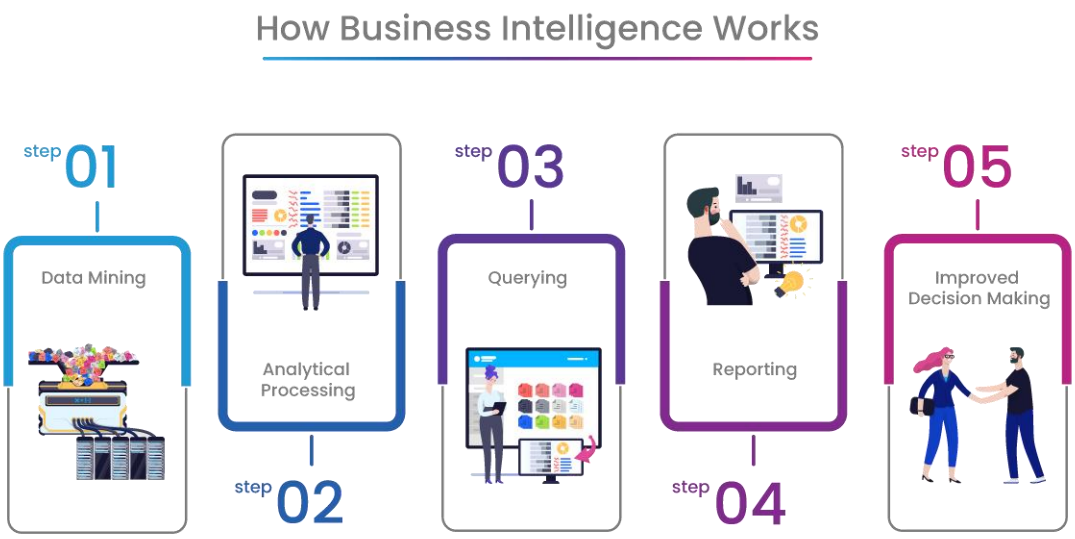
1. What is Business Intelligence (BI)

Business intelligence (BI) is a technology-based process that analyzes data and provides actionable information to assist CEOs, managers, and employees make sound business choices.

Organizations acquire data for analysis from internal information technology (IT) systems and external sources as part of the BI process, execute data-driven queries, and build data visualizations, BI dashboards, and reports to deliver analytical findings to business users. From there, assist them in making operational, planning, and strategic choices.

The ultimate purpose of business intelligence efforts is to drive better business choices, allowing firms to grow revenue, enhance operational efficiency, and gain a competitive advantage over competitors. BI accomplishes this purpose by combining analytics, data management, and reporting technologies, as well as numerous strategies for successfully managing and analyzing data.

2. How does the Business Intelligence work?



A business intelligence architecture consists of more than BI software. Data for business intelligence is often kept in a data warehouse designed for a complete organization, or in smaller data marts that carry subsets of business information for various departments and business units, frequently with linkages to an enterprise data warehouse. Furthermore, Hadoop clusters or other big data systems-based data lakes are increasingly being utilized as repositories or landing pads for BI and analytics data, particularly log files, sensor data, text, and other forms of unstructured or semistructured data.

Historical information and real-time data received from source systems as it is created can be included in BI data, allowing BI tools to support both strategic and tactical decision-making processes. Before it can be utilized in BI applications, raw data from various source systems must often be merged, aggregated, and cleaned using data integration and data quality management solutions to guarantee that BI teams and business users are studying correct and consistent data.

The following are the phases in the BI process from there:

• Data organization and modeling, which is used to prepare data sets for analysis.

• Analyzing the presented data.

• Results distribution to corporate users, including key performance indicators (KPIs).

• Applying data to advise and steer business decisions.

3. Why business intelligence is important?

Business Intelligence (BI) is important for many reasons, as it brings many benefits to organizations, first of all, it helps make informed decisions. BI helps organizations make informed, data-driven decisions . By providing access to relevant data and insights, it enables decision makers to choose the most effective strategies and actions. Second, improving business performance BI allows organizations to monitor key performance indicators (KPIs) and evaluate their performance. This leads to the identification of areas where improvements can be made, thereby enhancing operational efficiency and competitiveness. Third Competitive Advantage BI provides organizations with a competitive advantage by helping them understand market trends, customer preferences, and competitors' actions. With this information, companies can adapt quickly to changes in their industry and market. Fourth BI customer insights enable organizations to better understand their customers. It can help identify customer behavior, preferences and purchasing patterns, which can be used to tailor marketing efforts and improve customer service. And ultimately reducing costs by identifying inefficiencies and areas where resources can be optimized, BI can help organizations reduce costs. This may involve improving supply chain management, reducing waste or streamlining processes.

4. Real examples of how to apply BI on business.

Example 1:

Cementos Argos: BI Improves Financial Efficiency

Cementos Argos, a Colombian cement and concrete producer, is a real-world example of how Business Intelligence (BI) can significantly improve financial efficiency. Cementos Argos leveraged BI tools and techniques to optimize various aspects of their financial operations.

- **Challenge**: The company looked for an overall competitive advantage and a way to support better decision-making.
- **Solution**: Cementos Argos created a dedicated business analytics center. The company invested in experienced business analysts and data science teams and used BI to leverage data.
- **Results**: The company standardized the finance process and applied big data to gain more in-depth insight into customer behavior which yielded a higher profitability level.

Cementos Argos utilized Business Intelligence to gain insights into their financial operations, reduce costs, increase revenue, and manage cash flow effectively. By making data-driven decisions and improving their financial processes, they were able to enhance their overall financial efficiency and remain competitive in the construction and cement industry. This real-world example illustrates the practical applications and benefits of BI in the financial domain.

Example 2:

Sabre Airline Solutions: BI Accelerates Business Insights

Sabre Airline Solutions is a leading provider of technology solutions for the airline industry. They have successfully implemented Business Intelligence (BI) to accelerate business insights, optimize operations, and enhance decision-making.

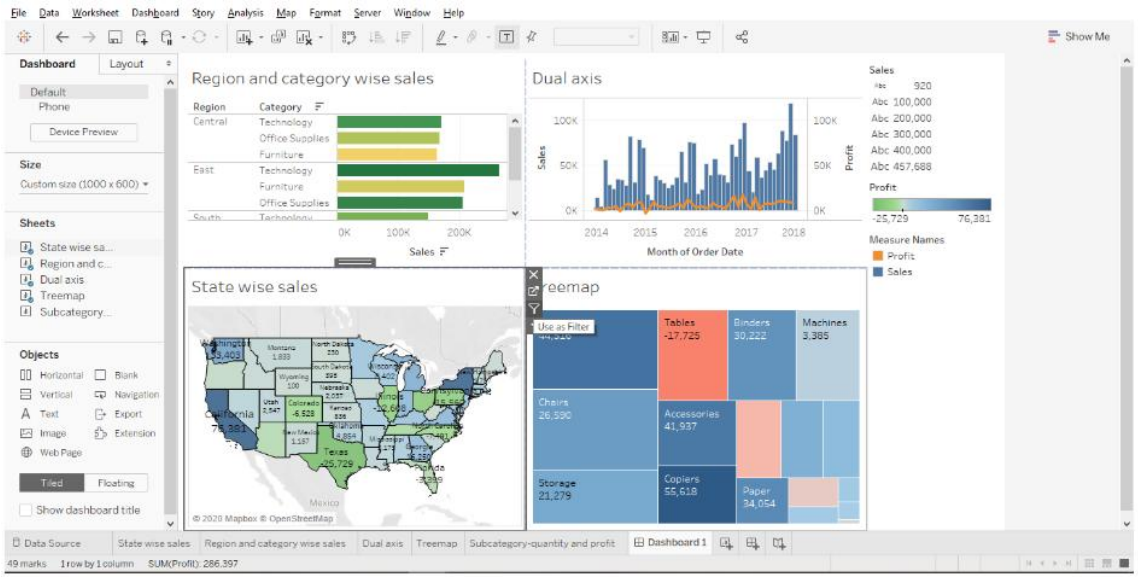
- **Challenge**: The travel industry is remarkably fast paced. And Sabre's clients needed advanced tools that could provide real-time data on customer behavior and actions.
- **Solution**: Sabre developed an enterprise travel data warehouse (ETDW) to hold its enormous amounts of data. Sabre executive dashboards provide near real-time insights in user-friendly environments with a 360-degree overview of business health, reservations, operational performance and ticketing.
- **Results**: The salable infrastructure, graphic user interface, data aggregation and ability to work collaboratively have led to more revenue and increased client satisfaction.

Sabre Airline Solutions effectively applied Business Intelligence to accelerate business insights within the airline industry. They harnessed data from various sources to optimize operations, enhance customer experiences, increase revenue, and reduce costs. This real-world example illustrates how BI can have a transformative impact on an industry, providing airlines with a competitive edge and improved decision-making capabilities.

5. BI Tools/ Technique.

5.1 Tools

- **Tableau**



Tableau, a powerful data visualization and business intelligence (BI) solution, allows users to transform unstructured data into interactive and visually appealing insights. Tableau is extensively used by businesses, analysts, and data professionals to analyze data, create interactive dashboards, and reach educated conclusions.

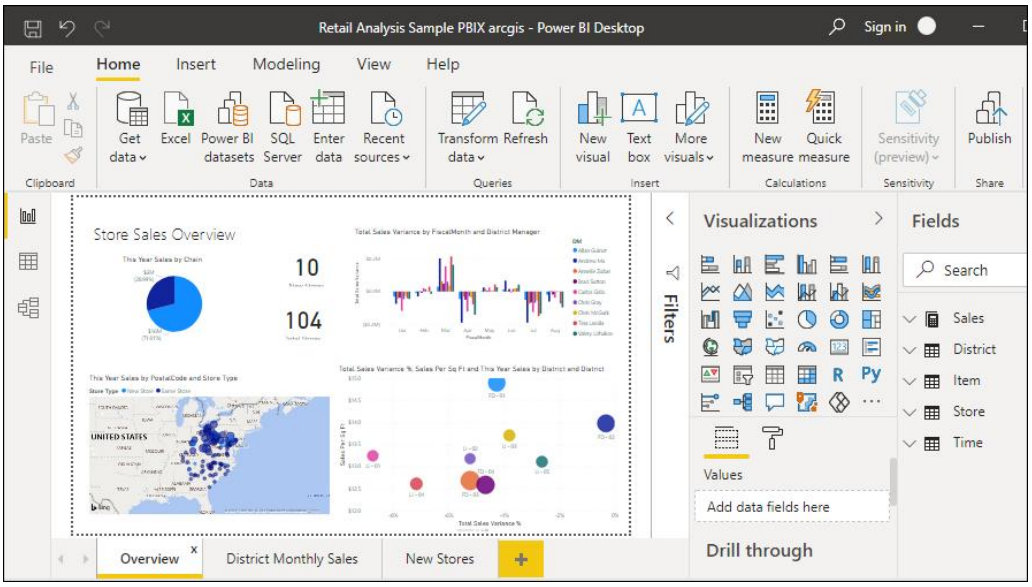
Because of its user-friendly interface and robust data analysis and visualization capabilities, Tableau is a great tool for anybody desiring to explore and successfully communicate ideas from data.

Tableau platforms enable users to use:

- **Tableau Desktop:** This is the primary authoring and development environment where users create and design data visualizations.
- **Tableau Server:** Tableau Server is a web-based platform for sharing and collaborating on Tableau content.
- **Tableau Online:** Similar to Tableau Server, Tableau Online is a cloud-based platform that allows users to publish and share Tableau workbooks and dashboards securely over the internet.
- **Tableau Mobile:** Tableau offers mobile apps for iOS and Android devices, allowing users to access and interact with Tableau reports and dashboards on smartphones and tablets.
- **Tableau Reader:** Tableau Reader is a free desktop application that allows users to open and interact with Tableau workbooks and visualizations created by others.

- **Tableau Public:** Tableau Public is a free version of Tableau, but it has limitations regarding data privacy and publishing
- **Tableau Prep:** Tableau Prep is a separate tool that helps users clean, shape, and transform their data before using it in Tableau Desktop

- **Power BI**



Microsoft Power BI is a powerful business intelligence (BI) and data visualization application. It lets organizations and individuals to analyze data, create interactive reports and dashboards, and share insights to make better decisions. Microsoft Power BI is widely utilized across all industries and by organizations of all sizes to enhance decision-making processes and assist businesses in succeeding via the use of data-driven methods. Because of its user-friendly interface and integration with the Microsoft ecosystem, it is a popular choice for businesses looking to maximize the value of their data.

Power BI platforms allow users to use:

- **Power BI Desktop**: Power BI Desktop is the primary authoring and development tool for creating reports and visualizations.
- **Power BI Service (Power BI in the Cloud):** Power BI Service is a cloud-based platform that allows you to publish, share, and collaborate on Power BI reports and dashboards.
- **Power BI Mobile Apps:** Power BI offers mobile apps for iOS and Android devices. These apps allow you to access and interact with Power BI reports and dashboards on smartphones and tablets.
- **Power BI Report Server:** Power BI Report Server is an on-premises solution for organizations that want to keep their data and reports within their own network.
- **Power BI Embedded:** Power BI Embedded is a platform for developers to integrate Power BI

capabilities into custom applications and websites.

- **Power BI Premium:** Power BI Premium is a cloud-based service that offers dedicated capacity for organizations.
- **Power BI for SharePoint:** Power BI can be integrated with Microsoft SharePoint, making it possible to embed Power BI reports and dashboards directly into SharePoint sites and pages for collaboration and data sharing.

- **Programming Tools:**

Python: A popular programming language with libraries such as Pandas, NumPy, and Scikit-learn that offer extensive data manipulation, analysis, and machine learning capabilities.

5.2 Techniques

- **Collection technique.**

"Collection technique" is a wide phrase that can apply to a variety of ways and approaches for obtaining data or information. The exact collecting strategy employed is determined by the type of the data, the study aims, and the situation in which the data is gathered. Data cleansing and data labeling are two fundamental strategies for ensuring data quality.

- Data cleansing, also known as data cleansing or data filtering, is the process of finding and correcting flaws or inconsistencies in a data set in order to enhance data quality. This procedure comprises verifying data, deleting duplicates, addressing spelling and formatting errors, and adding missing numbers. Data cleaning is crucial because erroneous or inconsistent data can lead to inaccurate analysis, modeling, and decision making. Clean data is required for relevant insights and effective predictive models.
- Data labeling, also known as data annotation, is the act of adding meaningful labels or tags to data, most notably in supervised machine learning. This stage is critical when dealing with datasets for tasks like as classification, object identification, sentiment analysis, or any other application where the model requires labeled samples to learn from.

Data cleaning and labeling are both necessary to ensure that your data is of high quality, accurate, and acceptable for analysis or modeling. These procedures are essential for data preparation and play an important part in the success of data-driven projects.

- **Analysis technique.**

Analysis techniques are methods and procedures for examining data, discovering patterns, gaining

insights, and drawing conclusions from data. Data analysis, corporate intelligence, scientific research, and decision-making all rely on these methodologies. Reports, queries, and dashboards are all important tools in Business Intelligence (BI) and data analysis. Each of these strategies has a certain function in terms of getting insights from data.

- Reports in BI give a systematic and ordered display of data, frequently in printed or digital media. Tables, charts, graphs, and textual data descriptions are common components of reports. BI reports can be generated on a daily, weekly, or monthly basis, or on an as-needed basis to fulfill specific information demands. They are used to measure and analyze corporate progress, to identify trends, and to make data-driven decisions.
- Queries are used in business intelligence to extract specified subsets of data from a database or dataset. They are dynamic, allowing users to filter, sort, and change data according to their preferences. Queries can return raw or filtered data, as well as options for customisation. They may be used to investigate data in real time. Businesses utilize structured query language (SQL) or query tools to discover data that fits particular requirements or standards. They enable firms to discover answers to particular queries, identify patterns, and investigate how data is connected.
- Dashboards in business intelligence (BI) give an instant snapshot of key performance indicators (KPIs), data trends, and real-time insights. Dashboards are made up of interactive and dynamic visuals, charts, and widgets.Tableau, Power BI, QlikView, and other BI tools are popular for building interactive and dynamic dashboards.

- **Analytic technique.**

Analytic techniques are methods and approaches for analyzing data in order to derive relevant insights or patterns. These approaches are used to get a better understanding of information in a variety of domains, including data analysis, business intelligence, statistics, and data science. Analytic techniques like regression and machine learning are important tools for data analysis, predictive modeling, and decision-making in a variety of domains.

- Regression is a statistical data analysis technique for determining correlations between variables. It predicts the value of one dependent variable based on the values of other independent variables. Data on sales, pricing, product sales, and other business parameters may all be analyzed using regression.
- Machine Learning is a data analysis technique that use computers to learn from data and anticipate results. Machine Learning can categorize data, forecast outcomes, and discover patterns in data. It may be used to examine customer, product, and other company activity data.

Both regression analysis and machine learning are useful tools for generating data-driven decisions. The decision between the two is determined by the individual situation, the kind of data, and the required amount of model complexity. While regression is commonly used for simpler correlations and linear modeling, machine learning allows for more complicated patterns to be handled and may be used to a larger range of activities.

II. BI applications.

1. Datasets

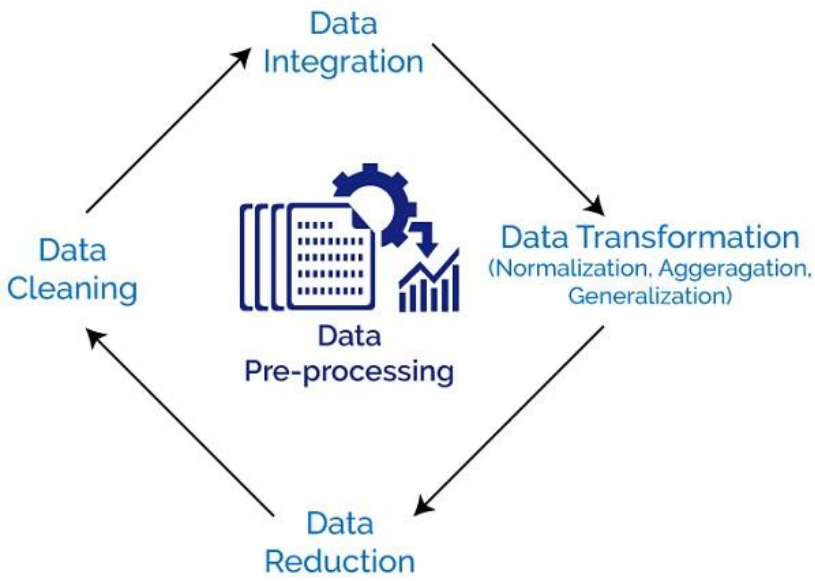
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total	Date	Time	Payment	cogs	gross margin percentage	gross income	Rating
2	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715	1/5/2019	13:08	Ewallet	522.83	4.761904762	26.1415	9.1
3	226-31-3081	C	Naypyitaw	Normal	Female	Electronic device	15.28	5	3.82	80.22	3/8/2019	10:29	Cash	76.4	4.761904762	3.82	9.6
4	631-41-3108	A	Yangon	Normal	Male	Electronic device	46.33	7	16.2155	340.5255	3/3/2019	13:23	Credit card	324.31	4.761904762	16.2155	7.4
5	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.288	489.048	1/27/2019	20:33	Ewallet	465.76	4.761904762	23.288	8.4
6	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.3785	2/8/2019	10:37	Ewallet	604.17	4.761904762	30.2085	5.3
7	699-14-3026	C	Naypyitaw	Normal	Male	Electronic accessories	85.39	7	29.8865	627.6165	3/25/2019	18:30	Ewallet	597.73	4.761904762	29.8865	4.1
8	355-53-5943	A	Yangon	Member	Female	Electronic accessories	68.84	6	20.652	433.692	2/25/2019	14:36	Ewallet	413.04	4.761904762	20.652	5.8
9	315-22-5665	C	Naypyitaw	Normal	Female	Home and lifestyle	73.56	10	36.78	772.38	2/24/2019	11:38	Ewallet	735.6	4.761904762	36.78	8
10	665-32-9167	A	Yangon	Member	Female	Electronic device	36.26	2	3.626	76.146	1/10/2019	17:15	Credit card	72.52	4.761904762	3.626	7.2
11	692-92-5582	B	Mandalay	Member	Female	Food and beverages	54.84	3	8.226	172.746	2/20/2019	13:27	Credit card	164.52	4.761904762	8.226	5.9
12	351-62-0822	B	Mandalay	Member	Female	Electronic device	14.48	4	2.896	60.816	2/6/2019	18:07	Ewallet	57.92	4.761904762	2.896	4.5
13	529-56-3974	B	Mandalay	Member	Male	Electronic accessories	25.51	4	5.102	107.142	3/9/2019	17:03	Cash	102.04	4.761904762	5.102	6.8
14	365-64-0515	A	Yangon	Normal	Female	Electronic device	46.95	5	11.7375	246.4875	2/12/2019	10:25	Ewallet	234.75	4.761904762	11.7375	7.1
15	252-56-2699	A	Yangon	Normal	Male	Food and beverages	43.19	10	21.595	453.495	2/7/2019	16:48	Ewallet	431.9	4.761904762	21.595	8.2
16	829-34-3910	A	Yangon	Normal	Female	Health and beauty	71.38	10	35.69	749.49	3/29/2019	19:21	Cash	713.8	4.761904762	35.69	5.7
17	299-46-1805	B	Mandalay	Member	Female	Electronic device	93.72	6	28.116	590.436	1/15/2019	16:19	Cash	562.32	4.761904762	28.116	4.5
18	656-95-9349	A	Yangon	Member	Female	Electronic device	68.93	7	24.1255	506.6355	3/11/2019	11:03	Credit card	482.51	4.761904762	24.1255	4.6
19	765-26-6951	A	Yangon	Normal	Male	Electronic device	72.61	6	21.783	457.443	1/1/2019	10:39	Credit card	435.66	4.761904762	21.783	6.9
20	329-62-1586	A	Yangon	Normal	Male	Electronic device	54.67	3	8.2005	172.2105	1/21/2019	18:00	Credit card	164.01	4.761904762	8.2005	8.6
21	319-50-3348	B	Mandalay	Normal	Female	Electronic device	40.3	2	4.03	84.63	3/11/2019	15:30	Ewallet	80.6	4.761904762	4.03	4.4
22	300-71-4605	C	Naypyitaw	Member	Male	Electronic device	86.04	5	21.51	451.71	2/25/2019	11:24	Ewallet	430.2	4.761904762	21.51	4.8
23	371-85-5789	B	Mandalay	Normal	Male	Electronic device	87.98	3	13.197	277.137	3/5/2019	10:40	Ewallet	263.94	4.761904762	13.197	5.1
24	273-16-6619	B	Mandalay	Normal	Male	Electronic device	33.2	2	3.32	69.72	3/15/2019	12:20	Credit card	66.4	4.761904762	3.32	4.4
25	636-48-8204	A	Yangon	Normal	Male	Electronic accessories	34.56	5	8.64	181.44	2/17/2019	11:15	Ewallet	172.8	4.761904762	8.64	9.9
26	549-59-1358	A	Yangon	Member	Male	Sports and travel	88.63	3	13.2945	279.1845	3/2/2019	17:36	Ewallet	265.89	4.761904762	13.2945	6
27	227-03-5010	A	Yangon	Member	Female	Home and lifestyle	52.59	8	21.036	441.756	3/22/2019	19:20	Credit card	420.72	4.761904762	21.036	8.5
28	649-29-6775	B	Mandalay	Normal	Male	Fashion accessories	33.52	1	1.676	35.196	2/8/2019	15:31	Cash	33.52	4.761904762	1.676	6.7
29	189-17-4241	A	Yangon	Normal	Female	Fashion accessories	87.67	2	8.767	184.107	3/10/2019	12:17	Credit card	175.34	4.761904762	8.767	7.7
30	145-94-9061	B	Mandalay	Normal	Female	Food and beverages	88.36	5	22.09	463.89	1/25/2019	19:48	Cash	441.8	4.761904762	22.09	9.6
31	848-62-7243	A	Yangon	Normal	Male	Health and beauty	24.89	9	11.2005	235.2105	3/15/2019	15:36	Cash	224.01	4.761904762	11.2005	7.4
32	871-79-8483	B	Mandalay	Normal	Male	Fashion accessories	94.13	5	23.5325	494.1825	2/25/2019	19:39	Credit card	470.65	4.761904762	23.5325	4.8

Our research team's dataset is termed "sales system" and is available on the Kaggle platform. The data collection contains detailed information about customers, including sales numbers across several platforms and locations. The dataset offered contains a wide range of information that may be systematically studied to get significant insights about the point of sale systems business.

This database uses 17 variables linked to marketing data (Invoice ID, Branch, City, Customer type, Gender, etc.) to reflect the sales system's marketing operations. The variables offer particular information about the following: The organization's sales system has 1000 details on the things that clients have purchased.

As you can see, this graphic contains every piece of client data that was mined, such as distinct customer identities, details about new and returning consumers, and details about products. Along with 17 columns of information on the goods and brands they bought, etc.

2. Pre-processed Data.



Pre-processed data is data that has been cleaned, transformed, and prepared in order to be appropriate for analysis or modeling. Data pre-processing is an important stage in data analysis, machine learning, and other data-driven processes because it improves data quality and guarantees that the data is in a format that can be utilized successfully for subsequent research.

Data cleaning is the process of dealing with missing values by imputing them or eliminating rows or columns that contain missing data. Outliers that may distort the analysis or modeling findings must be identified and addressed.To guarantee data consistency, duplicate records must be identified and removed.

Data Integration is combining data from multiple sources to create a unified dataset for analysis.

Data transformation is the process of scaling numerical data to have a mean of 0 and a standard deviation of 1 in order to bring characteristics to a common scale. Scaling data to a specified range (e.g., 0 to 1) to make it more suited for certain algorithms. Converting categorical variables to numerical representations, sometimes via one-shot encoding or label encoding.Adding new features or changing existing ones to acquire essential data.

Data Reduction is reducing the number of features while retaining important information using techniques like principal component analysis (PCA) reducing the size of the dataset by taking random samples when dealing with large datasets.

Processing data using Python Library

Columns:
The dataset has the following columns:

1. Invoice ID: Unique identifier for each sales invoice.
2. Branch: The branch of the supermarket where the sale took place (A, B, or C).
3. City: The city where the branch is located (Yangon, Naypyitaw, or Mandalay).
4. Customer type: Whether the customer is a member or a normal customer.
5. Gender: The gender of the customer (Male or Female).
6. Product line: The category of the product being sold (e.g., Health and beauty, Electronic device, Sports and travel).
7. Unit price: The price of one unit of the product.
8. Quantity: The number of units sold.
9. Tax 5%: The tax amount (5% of the total price).
10. Total: The total amount of the sale (including tax).
11. Date: The date of the sale.
12. Time: The time of the sale.
13. Payment: The payment method used (Ewallet, Cash, Credit card).
14. cogs: Cost of goods sold (Total - Tax).
15. gross margin percentage: The gross margin percentage.
16. gross income: The gross income (Total - cogs).
17. Rating: The customer rating for the supermarket (on a scale of 0 to 10).

Rows:
The dataset contains multiple rows, with each row representing a separate sales transaction. Each row corresponds to a unique sales invoice.

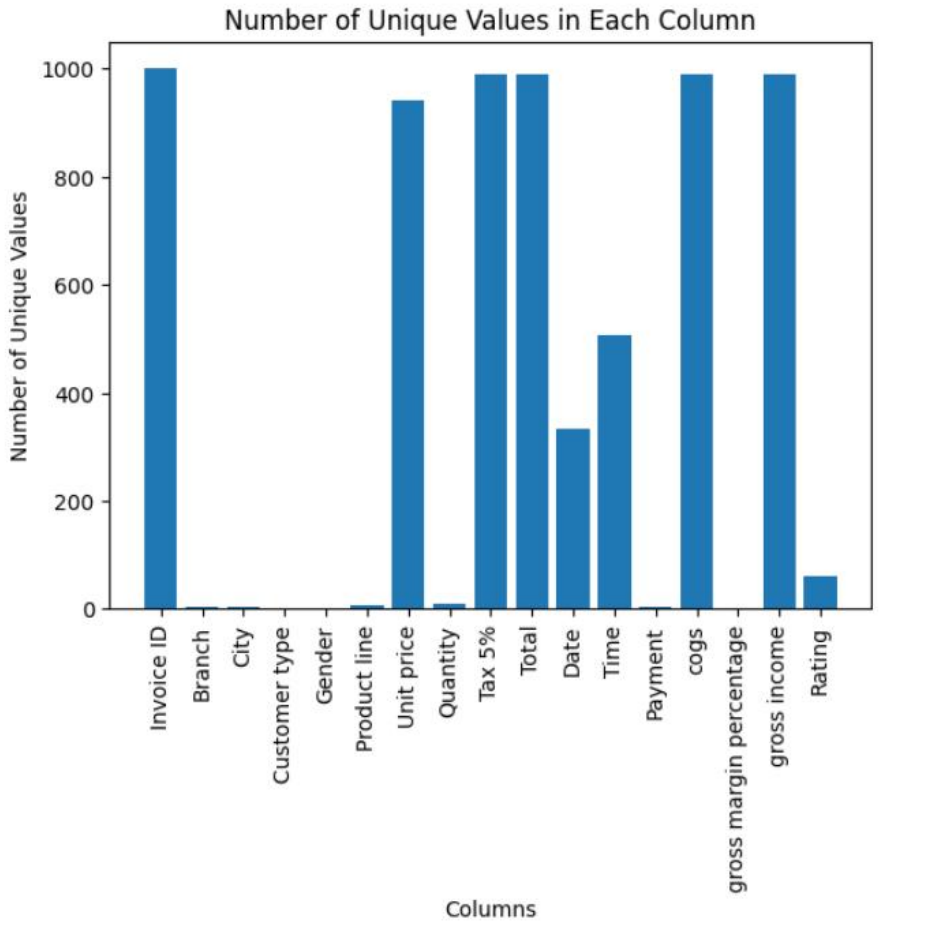
	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total	Date	Time	Payment	cogs	gross margin percentage	gross income	Rating
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715	1/5/2019	13:08	Ewallet	522.83	4.761905	26.1415	9.1
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic device	15.28	5	3.8200	80.2200	3/8/2019	10:29	Cash	76.40	4.761905	3.8200	9.6
2	631-41-3108	A	Yangon	Normal	Male	Electronic device	46.33	7	16.2155	340.5255	3/3/2019	13:23	Credit card	324.31	4.761905	16.2155	7.4
3	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.2880	489.0480	1/27/2019	20:33	Ewallet	465.76	4.761905	23.2880	8.4
4	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.3785	2/8/2019	10:37	Ewallet	604.17	4.761905	30.2085	5.3

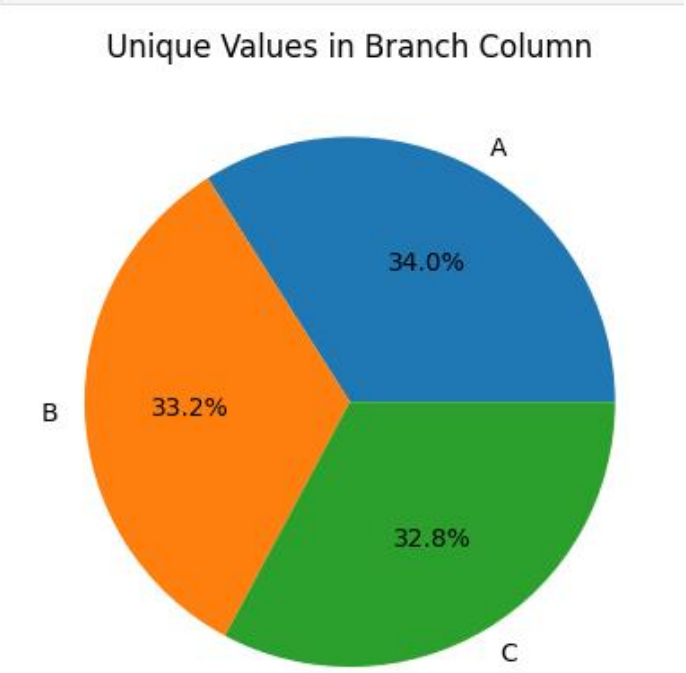
Unique Values:

To determine the unique values in each column, we can iterate through the dataset and collect the distinct values for each column. Here are some examples of unique values in certain columns:

- Branch: A, B, C
- City: Yangon, Naypyitaw, Mandalay
- Customer type: Member, Normal
- Gender: Male, Female
- Product line: Health and beauty, Electronic device, Sports and travel, etc.

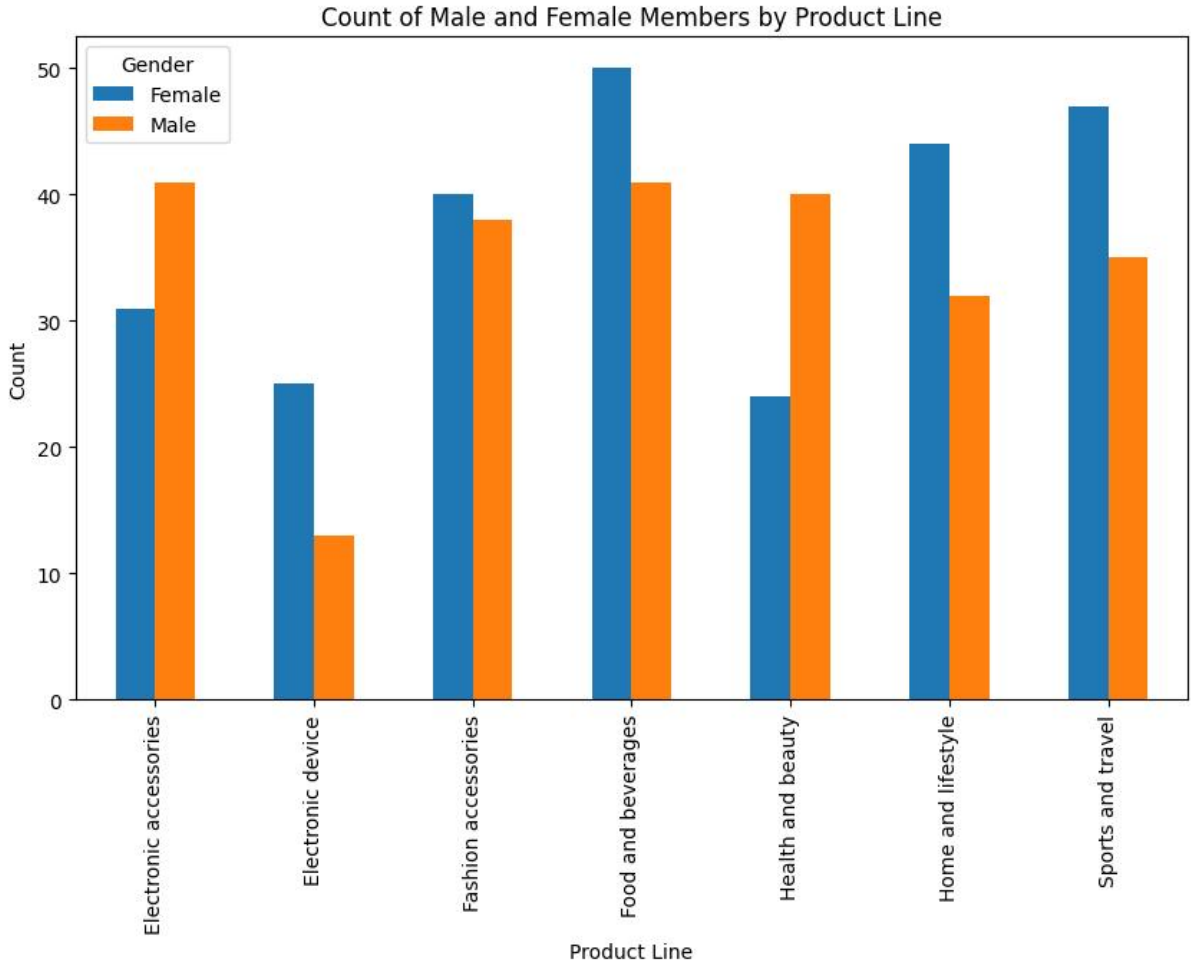
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 17 columns):
 #   Column                   Non-Null Count  Dtype
---  ------                   --------------  -----
 0   Invoice ID               1000 non-null   object
 1   Branch                   1000 non-null   object
 2   City                     1000 non-null   object
 3   Customer type            1000 non-null   object
 4   Gender                   1000 non-null   object
 5   Product line             1000 non-null   object
 6   Unit price               1000 non-null   float64
 7   Quantity                 1000 non-null   int64
 8   Tax 5%                   1000 non-null   float64
 9   Total                    1000 non-null   float64
 10  Date                     1000 non-null   datetime64[ns]
 11  Time                     1000 non-null   object
 12  Payment                  1000 non-null   object
 13  cogs                     1000 non-null   float64
 14  gross margin percentage  1000 non-null   float64
 15  gross income             1000 non-null   float64
 16  Rating                   1000 non-null   float64
dtypes: datetime64[ns](1), float64(7), int64(1), object(8)
memory usage: 132.9+ KB
```


Number of Unique Values in Each Column
Number of Unique Values
1000
800
600
400
200
0
Invoice ID
Branch
City
Customer type
Gender
Product line
Unit price
Quantity
Tax 5%
Total
Date
Time
Payment
cogs
gross margin percentage
gross income
Rating
Columns



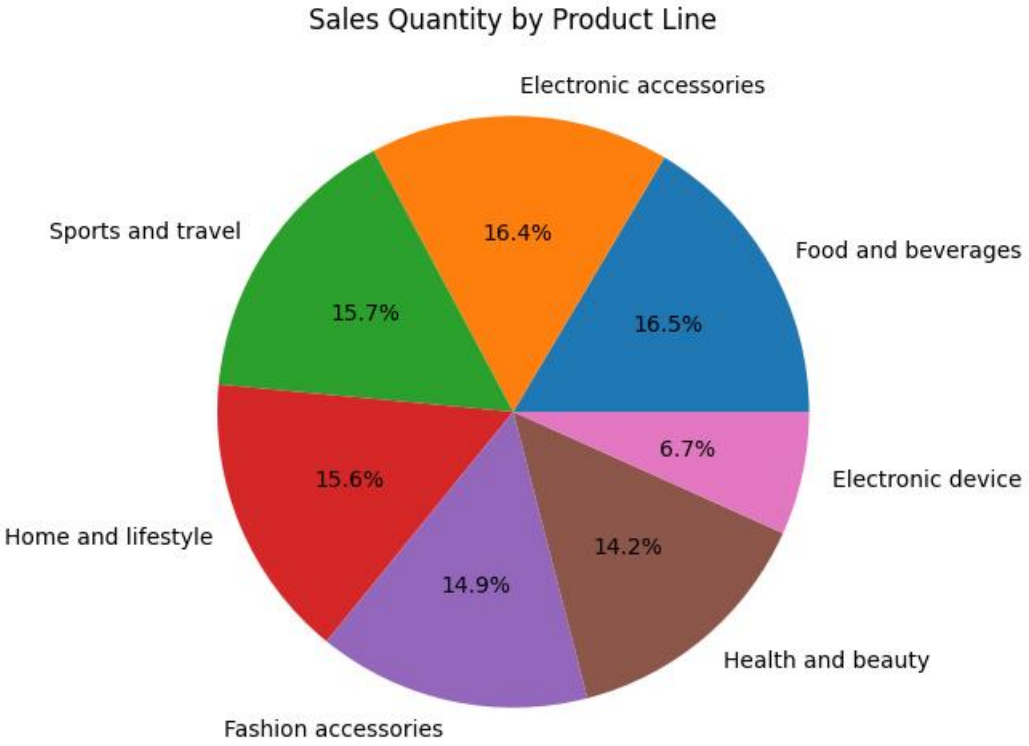
_Show total purchases of product line by customer type (gender)

Gender	Female	Male
Product line		
Electronic accessories	31	41
Electronic device	25	13
Fashion accessories	40	38
Food and beverages	50	41
Health and beauty	24	40
Home and lifestyle	44	32
Sports and travel	47	35


Count of Male and Female Members by Product Line
Gender
Female
Male
Count
0
10
20
30
40
50
Electronic accessories
Electronic device
Fashion accessories
Food and beverages
Health and beauty
Home and lifestyle
Sports and travel
Product Line

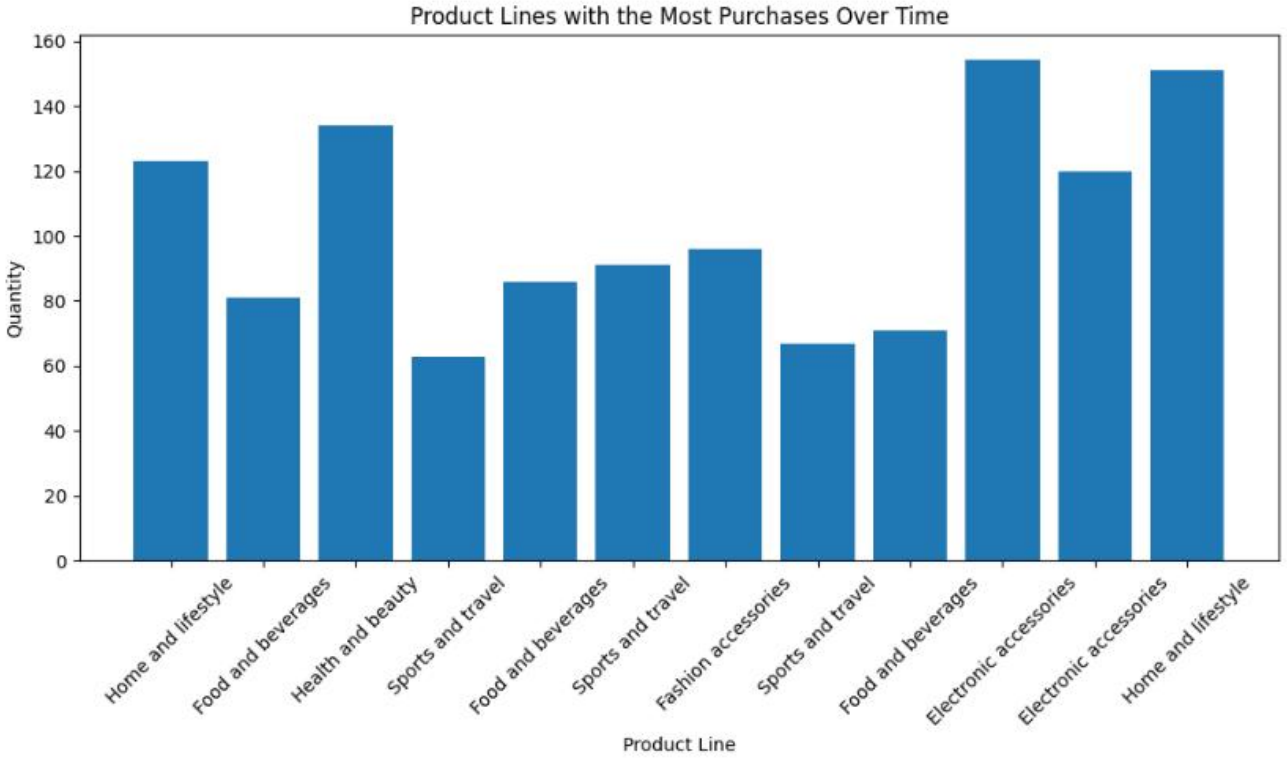
_Analyze product lines with the highest purchases

	Product line	Quantity
3	Food and beverages	907
0	Electronic accessories	901
6	Sports and travel	866
5	Home and lifestyle	860
2	Fashion accessories	821
4	Health and beauty	784
1	Electronic device	371



_Statistics on product lines with the most purchases over time and bar chart

	Year	Month	Product line	Quantity
5	2019	1	Home and lifestyle	123
10	2019	2	Food and beverages	81
18	2019	3	Health and beauty	134
27	2020	1	Sports and travel	63
31	2020	2	Food and beverages	86
41	2020	3	Sports and travel	91
44	2021	1	Fashion accessories	96
55	2021	2	Sports and travel	67
59	2021	3	Food and beverages	71
63	2022	1	Electronic accessories	154
70	2022	2	Electronic accessories	120
82	2022	3	Home and lifestyle	151

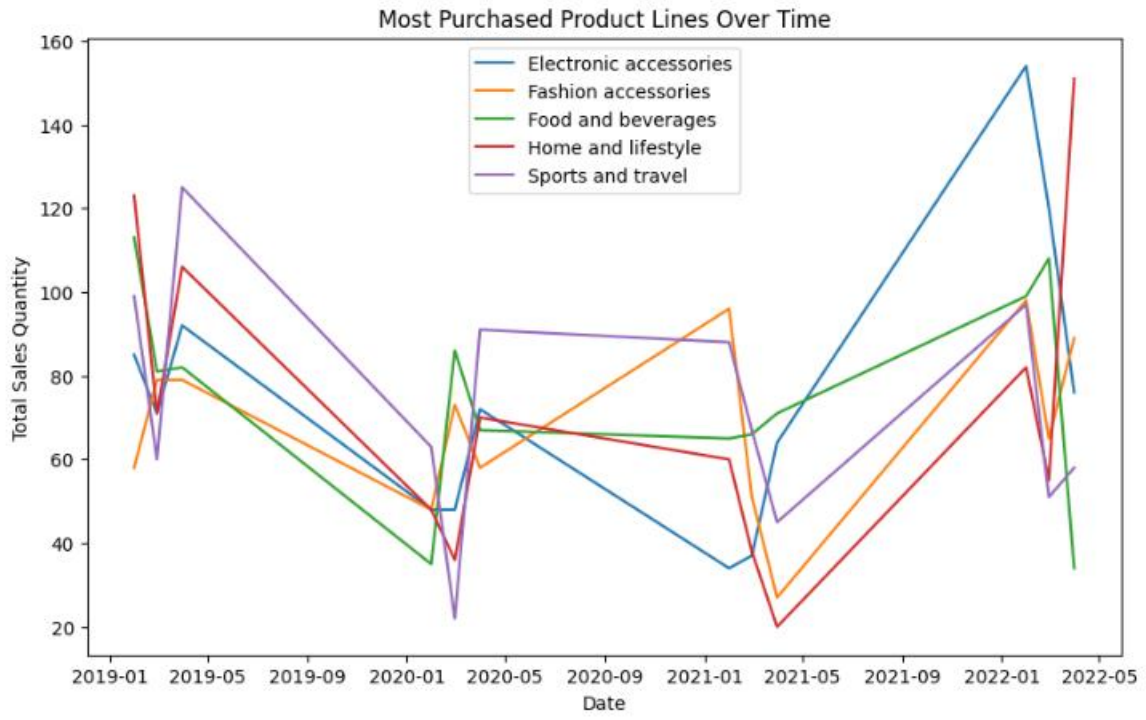


_Pivot table and line chart to display the statistical data

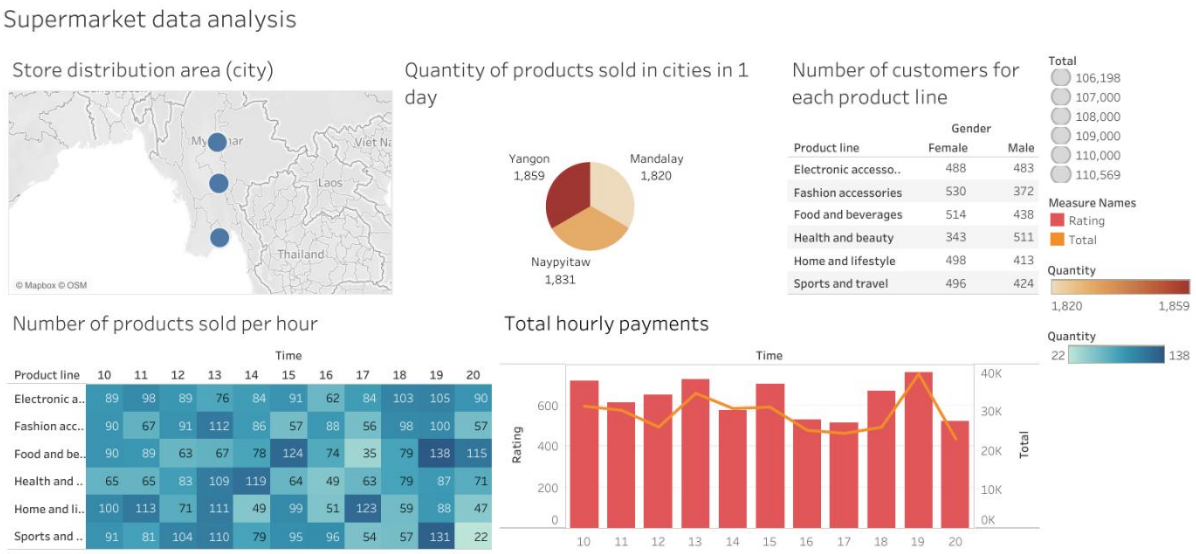
Date	2019-01-31	2019-02-28	2019-03-31	2020-01-31
Product line				
Electronic accessories	85	71	92	48
Fashion accessories	58	79	79	48
Food and beverages	113	81	82	35
Home and lifestyle	123	71	106	48
Sports and travel	99	60	125	63

Date	2020-02-29	2020-03-31	2021-01-31	2021-02-28
Product line				
Electronic accessories	48	72	34	37
Fashion accessories	73	58	96	51
Food and beverages	86	67	65	66
Home and lifestyle	36	70	60	38
Sports and travel	22	91	88	67

Date	2021-03-31	2022-01-31	2022-02-28	2022-03-31
Product line				
Electronic accessories	64	154	120	76
Fashion accessories	27	98	65	89
Food and beverages	71	99	108	34
Home and lifestyle	20	82	55	151
Sports and travel	45	97	51	58



3. Dashboard



- The total number of products sold in 1 day is 106,198 products.
- The number of products sold in cities in 1 day is:

  Yangon: 1,859 products

  Mandalay: 1,831 products

  Napyitaw: 1,820 products
- The chart shows the number of male and female members of each product line
- The chart shows the number of products sold from 10:00 - 20:00
- The chart shows all payments by rating

The number of products sold in Yangon is the highest, followed by Mandalay and Napyitaw. This may be because Yangon is a large potential market with a large population and increasing income.

These are the hours when customers often shop the most. Supermarket managers can take advantage of this time to enhance sales and marketing activities.

Overview of a supermarket's sales activities in 1 day. This analysis can be used to track sales performance, identify trends and opportunities, and make informed business decisions.

III. Point of view.

1. Discuss how BI tools can contribute to effective decision-making

In general, BI technologies enable companies to harness data for better decision-making by facilitating data access, visualizing information, and allowing data-driven insights. Organizations may use BI technologies to make educated decisions that lead to increased efficiency, decreased risks, and more effective resource allocation, eventually contributing to their success and growth.

- **Data aggregation and consolidation:**

Data aggregation and consolidation are important parts of Business Intelligence (BI) since they require gathering data from many sources and putting it into a format appropriate for analysis and reporting. BI solutions play an important part in these processes by offering the functionality and capabilities required to successfully collect and integrate data.

Example:

A retailer with various shop locations and an online presence want to acquire insights into its sales and inventory data in order to optimize stock levels and make better decisions. The firm may monitor inventory levels across all storefronts and online sales channels in real-time by collecting and combining data. This helps companies avoid overstocking and stockouts while also optimizing working capital.

- **Data Visualization**

Data visualization is the use of graphics to help people comprehend the information contained in data. It makes complicated statistics more accessible, comprehensible, and actionable by utilizing visual features such as charts, graphs, and maps. Effective data visualization may highlight trends, patterns, outliers, and insights that raw data alone may not disclose.

Example:

A worldwide health group is analyzing and displaying COVID-19 data to track the virus's progress, assess its impact on different locations, and give policymakers and the public with insights. The interactive dashboards give real-time reports on the course of the epidemic, allowing authorities to make educated decisions.

- **Real-Time Reporting**

Real-time reporting with Business Intelligence (BI) technologies entails developing and delivering real-time data visualizations, dashboards, and reports that enable users to monitor and evaluate data as

events occur. It enables real-time data-driven decision-making by providing fast access to vital information.

Example:

A retailer with various shop locations, an e-commerce website, and a mobile app want to improve sales and inventory management. As a BI tool, they utilize Microsoft Power BI. Inventory levels may be tracked on a daily basis by store managers to measure demand and optimize restocking plans to minimize overstocking and out-of-stock situations. Real-time data enables decision-makers to alter production and marketing tactics in real time to meet demand and enhance sales.

2. Legal issues involved in exploiting user data for business intelligence

Exploiting user data for corporate information can create a number of legal and ethical problems, particularly as global data protection standards become more rigorous. Some of the legal challenges and considerations of the acquisition and use of user data for business intelligence include the following.

- **Data Privacy Regulations:** GDPR requires enterprises in the European Union to seek express consent from individuals before collecting and processing their personal data. In addition, it requires data protection impact evaluations and the hiring of data protection officers.
- **Data Consent and Transparency:** Before collecting and processing data from users, businesses must seek their informed consent.Transparency requires clear and widely available privacy policies and terms of service.
- **Data Security:** Legal obligations exist to protect user data from breaches and unauthorized access.Security measures, such as encryption and access controls, must be in place to safeguard sensitive data.
- **Data Minimization:** Organizations should collect only the data necessary for their intended business intelligence purposes.Over-collection of user data could lead to legal complications and privacy violations.

It is important to adopt a proactive and ethical approach to user data collection and business intelligence to ensure legal compliance and protect user privacy.

Task table

Task	Work	Status	Name	Self-Evaluate	Evaluate (Leader)
1. Demonstrate the use of business intelligence tools and technologies	Find definition, examples of BI and BI techniques	Personal	Minh Thanh	9	9
	Find examples of some BI tools	Personal	Minh Thanh	10	10
	Analyze dataset	Personal	Trung Tin	9	10
	Pre-process data	Work in group	Minh Thanh, Trung Tin	10	10
	Create dashboard	Work in group	Minh Thanh, Trung Tin	10	10
2. Discuss the impact of business intelligence tools and technologies	BI tools can contribute to effective decision-making	Work in group	Minh Thanh, Trung Tin	10	10
	Legal issues involved	Personal	Trung Tin	9	9
3. Prepare slides and speaker notes	Create slides from found information and write speaker notes for slides	Work in group	Minh Thanh, Trung Tin	10	10

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