Use case

Since the past few decades, data has raised its value to be a precious asset, these collected data can be used for numerous studies and processes. Nowadays, the data is omnipresent, it is available in many sources and types. The collection of data is known as big data when it matches the characteristics of 5Vs, which are volume, veracity, variety, value, and velocity (Big Data Characteristics - JavaTpoint, 2024). After a series of analysis and studies done on the big data, the omniscient and omnipotent nature can be utilized.

In retail, big data is used in customer analytics, inventory management, price optimization, fraud detection, operational efficiency, and market intelligence (Nicoleta, 2023). The application and analytics of big data enhance the business process and maximize retailer profit.

Large companies such as Amazon, Target, Walmart, and many other giant retailers use big data instead of conventional data analytics due to high massive volume, high velocity, and rich variety in their data collection. Hence, big data analytics is more effective in coping and solving the retail problems in terms of optimizing the inventory, cost reduction, get a real-time insight and minimize stock vacancies.

Big Data Management Solution

Big data management (BDM) is the administration, organization, and governance of large volumes of structured and not structured data. It is applied to deal with enormous and expanding data pools that contain hundreds of terabytes (TB) or petabytes (PB) of data. An effective BDM able to extract insights from the ocean of semi-structured and unstructured data (Simplilearn, 2022).

Big data processing starts from data acquisition or gathering, where the collected raw data would need to be processed. Next, raw data collected would be transformed into a usable and understandable format during data transformation process through cleaning and transformations, where techniques like aggregation, normalization, feature selection, etc. are involved. Thirdly, the transformed data would then be

loaded into the central database. Fourth step is visualisation or analytic, dashboards would be created with various charts and diagrams with business intelligence (BI) tools to give an overview of the big data. Analysis done with the BI tools help the stakeholders to understand patterns and make decisions. Last step is the application of machine learning to solve the business problems, like prediction of prices, classification and etc (Kumar, 2022).

The application of BDM and solutions for use cases in retails are (ProjectPro, 2015):

1. **Inventory management**: Able to predict the demand and supply of the items through analyzing the market trend, customer's preference, sales data from the past, and other factors. This allows the retailers to optimize their inventory at the right time to prevent loss in terms of overstock and under supply.
2. **Price optimisation**: Pricing strategy can be optimised by analyse the competitors' promotions and amount, then adjust own prices to match or remain competitive in the market. To improve the strategy, a dynamic pricing algorithm that respond to current market demand can be deployed to maximise revenue with little human intervention. The collected data would also shows buying patterns of the customer, thus allows retailers to set discounts and promotions at the right time to attract potential customers. For instance, Black Friday, 11.11 sales, Christmas Sales, New Year Sales, and etc. This pricing strategy is applied by Costco to maintain the profit by attracting price-aware shoppers.
3. **Personalised recommendation**: The retailers' website or mobile apps stored the purchase and browsing history of the customers along with their buying behaviors. This information allows the retailer to make analysis, thus tailor the recommendations and promotions based on the customer's preference. The e-commerce giant, Amazon, is famous for its personalization, where the large volume of customer data is being analyses to understand the consumer behaviors, then curate shopping experience by providing targeted advertisements and product recommendations. This method ensures customer engagement and repeat business (geoiq-admin, 2023).
4. **Market trend analysis**: The data of customer behaviours or market trends from social media, news, and other sources are collected for various analysis, such as sentiment analysis by using natural language processing to determine the if review is positive or not. This allows retailers to observe public reviews of the products on

different platforms and understand the latest market demand. From there, business decisions can be made with lower marketing costs by targeting the right platforms to distribute or promote the products.

5. **Fraud detection**: Fraudulent transactions occur on retail as much as airline companies and banks. To detect fraud, the big data containing customer details such as their purchasing behaviours, past records, payment card information, and etc, can be applied to identify potentially fraudulent activities when an anomaly occurred in their transaction or account activities. For example, when a bulk order of expensive products detected from a low spending regular customer, the operation officer would get alerted and make a call to the target customer. This helps retailer to prevent online fraud transaction, and monetary loss to the customer. Throughout the time, security of the system can also be enhanced with big data to improve integrity and reputation of retailers, also protect customer's information.
6. **Supply chain management**: The big data can be used in analyzing the inventory, transportation, and coordination log, then enhance the efficiency in operation through organizing the supply chain process, reduce overstock or under-stock and lead time (ProjectPro, 2015). Walmart minimize the cost of transport and schedule driver by studying the big data, then analyze the lanes and routes of transportation for their company lorries to ensure customers get their package on time (5 Ways Walmart Uses Big Data to Help Customers, 2017).

Conclusion

From the use cases, big data is valuable to retailers. Without big data, the business operations or mode would hardly be improved, and revenue might stay stagnant or reduce over time. In the worse scenario, outcome to the business is to face elimination from the market.

The wide application in retail field could benefit the companies from internal management to customer satisfaction, maximising revenue, and could potentially help banks in combating against fraudulent activities. As the phrase "facts don't lie", the result from analysis is inevitable one of the strongest in driving force in making business decision, to get a step closer towards business success.

(1033 words)

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