Academic Year 2025

Semester:1

Assignment Work- 1st

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Section:(C)

Course: Foundation of Data driven decision making

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Module 1: Introduction to Data-Driven Decision making

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Task 1: Describe a real world scenario where decision are made using data (eg., marketing, education, healthcare).

Real-world Scenario: Data-Driven Decision Making in Marketing

A retail company uses customer purchase data to make marketing decisions. They collect information such as customer's age, location, buying frequency, and product preferences. By analyzing this data, the company identifies that a large segment of young adults frequently buys sportswear during festive seasons.

The marketing team decides to:

- Launch targeted ads on social media platforms popular among young adults.
- offer discounts and loyalty rewards during those high-demand periods.
- Stock more sportswear in stores and warehouse before the festive season.

The company sees a significant increase in sales and customer engagement.

Real-world Scenario: Data-Driven Decision Making in Education

A university uses student performance data to improve learning outcomes. This institutions collects data such as attendence records, assignment scores, exam results, and student engagement on digital learning platforms.

After analyzing the data, the discover that students who regularly attend online discussion and submit assignments early tend to score higher in exams. Conversely, students who rarely log in to the learning portal often struggle academically.

Based on these insights, the university decides to:

- Introduce early-warning systems that alert teaches when a student's participation drops.
- Offer personalized tutoring or remedial classes for at-risk students.
- Redesign online courses to be more interactive and engaging.

The overall student's performance and retention rates improve significantly.

Compare and contrast descriptive, predictive, and prescriptive models using examples: (TASK 2):

1. Descriptive models.

Purpose: Explain what has happened in the past using historical data.

Goal: To summarize and identify patterns or trends from existing data.

Techniques used:
- Data aggregation.
- Data visualization (charts, dashboards).
- Statistical summaries (mean, median, frequency, correlation)

Examples (Healthcare):

A hospital analyzes patient admission data over the last year to identify which months have the highest number of flu cases.

- Insight: Flu cases peak b/w December ~~to~~ and February.
- use: Helps allocate staff and medical supplies accordingly.

2. Predictive models

Purpose: Forecast what is likely to happen in the future based on past data.

Goal: To use data patterns to make informed predictions.

Techniques used:
- machine learning (regression, classification)
- Time series forecasting
- Neural networks

Examples (Marketing):

An e-commerce company uses purchase history and browsing behavior to predict which customers are most likely to buy a product.

- Insight: Customers who viewed a product three times in a week have a 70% chance of purchasing it.
- Use: Send targeted promotions to those customers.

3. Prescriptive models.

Purpose: Recommend what actions should be taken to achieve a desired outcome.

Goal: To suggest the best possible decision or strategy based on data and predictions.

Techniques used:

- Optimization algorithms
- Simulation models
- Decision analysis and AI planning.

Example (supply chain):

A logistics company uses data on demand forecasts, fuel costs, and delivery routes to determine the most efficient delivery schedule.

- Insight: Re-routing deliveries through specific hubs reduces costs by 15%.
- use: Adjust operations for cost and time efficiency.

Task 3: List and categorize at least 5 internal and 5 external data sources for a company of your choice.

Internal data sources

No.	Internal data Source	Descriptive/Example
1.	Sales Transcations	Data from customer purchase, including product types, quantities, prices, and timestamps.
2.	customer Database	Information from user profiles, purchase history, browsing activity and feedback.
3.	Website Analytics	Data from user interactions on Amazon's platform (clickstream data, search queries, bounce rates).
4.	Inventory management systems	Data on product stock levels, warehouse operations, and supply chain movements.
5.	Employee and HR Records	Internal workforce data, including productivity, performance metrics, and staffing details

External data Sources

No.	External data Sources	Description/Example
1.	Social media Data	Insights from platforms like Twitter, Facebook, and Instagram about customer sentiment and brand perception.
2.	Market Research Reports	Industry trend data and competitor analysis. from agencies such as Statista, Nielsen, or Gartner.
3.	Economic Indicators	Government and financial institution data (e.g., inflation, consumer spending, GDP growth).
4.	Supplier and vendor Data	Information shared by manufacturers and logistics partners regarding pricing, shipping times, and availability.
5.	Customer Reviews and Ratings from Third party sites	Data from platforms like Trustpilot or product comparison websites to assess customer satisfaction.

Task 4: Reflect on how adopting a data-driven approach can improve decision quality in daily life or business.

1. Improved Accuracy and objective

Relying on data helps eliminate personal bias or assumptions. For instance, instead of choosing marketing channels base on intution, a business can ~~stat~~ analyze customer engagement metrics to identify which platforms yield the best return on investment.

2. Faster and more confident Decisions

With access to real-time data, individuals and organizations can make timely decisions. For example, retailers can adjust inventory based on current sales trends rather than waiting for monthly reports.

3. Predictive Insights.

Data-driven tools enable forecasting. Business can predict customer demand, market shifts, or equipment failures, allowing them to act proactively. Similarly, individuals can use health-tracking data to predict and prevent health issues through early interventions.

4. Continuous Improvement

Data-driven decision making encourages constant evaluation. Businesses can track performance indicators (KPIs) and use the data to refine strategies. In personal life, tracking habits - like exercise frequency or study hours helps in setting realistic goals and measuring progress.

5. Better Resource Allocation

Data clarifies where time, money, and effort are best spent. For example, school can use performance analytics to identify students who need extra support, while individuals can use time-tracking app to focus on high-value tasks.