Data Analytics Lab

Exercise 1: Big Data Concepts and Business Use Cases

Aim

To understand the fundamental concepts of Big Data, its characteristics, limitations of conventional data systems, and business use cases across various domains.

Steps:

1. Identify the Characteristics of Big Data (5Vs)

Big Data is defined by five key characteristics known as the **5Vs**:

a) Volume
Refers to the massive amount of data generated every second from sources such as social media, sensors, transactions, and IoT devices.
Example: Facebook generates terabytes of data daily.

b) Velocity
Indicates the speed at which data is generated, processed, and analysed.
Example: Real-time stock market data and online payment transactions.

c) Variety
Describes different types of data such as structured, semi-structured, and unstructured data.
Example: Text, images, videos, audio, logs, emails.

d) Veracity
Represents the quality, accuracy, and reliability of data.
Example: Noisy or incomplete social media data.

e) Value
Refers to the meaningful insights derived from data that support business decision-making.
Example: Customer behaviour analysis improving sales strategy.

2. Study Limitations of Conventional Systems

Traditional data processing systems face several limitations when handling Big Data:

- Limited storage capacity for large-scale data
- Inability to process data at high speed
- Poor scalability when data size increases
- Difficulty in handling unstructured and semi-structured data
- High cost of hardware upgrades
- Lack of real-time data processing support

Hence, conventional systems are inefficient for modern data-intensive applications.

3. Analyse Business Domains and Map Big Data Use Cases

Business Domain	Big Data Use Case
Healthcare	Disease prediction, patient monitoring, medical image analysis.
Banking & Finance	Fraud detection, credit risk analysis, algorithmic trading.
Retail	Customer behaviour analysis, recommendation systems, demand forecasting.
Education	Student performance analysis, personalized learning.
Transportation	Traffic prediction, route optimization.
Social Media	Sentiment analysis, trend detection.
Manufacturing	Predictive maintenance, quality control.

4. Summary:

It is understood that Big Data is characterized by the 5Vs-- Volume, Velocity, Variety, Veracity, and Value. Which together define the complexity and importance of modern data. Traditional data processing systems are inadequate to handle the scale, speed, and diversity of Big Data. The study of various business domains shows that Big Data plays a vital role in enabling data-driven decision-making, improving operational efficiency, predicting future trends, and enhancing customer experience. Overall, Big Data technologies provide organizations with a competitive advantage by transforming raw data into meaningful insights.

5. Result:

Hence the concepts of Big data, its characteristics, limitations of conventional systems and business cases were studied and analysed successfully.