Date		Session No	5

Topic : BI -Unit 1-2 Decision Support Systems

Decision Support Systems: Phases, Tools, and Practical Applications

Business Intelligence and data mining cycle

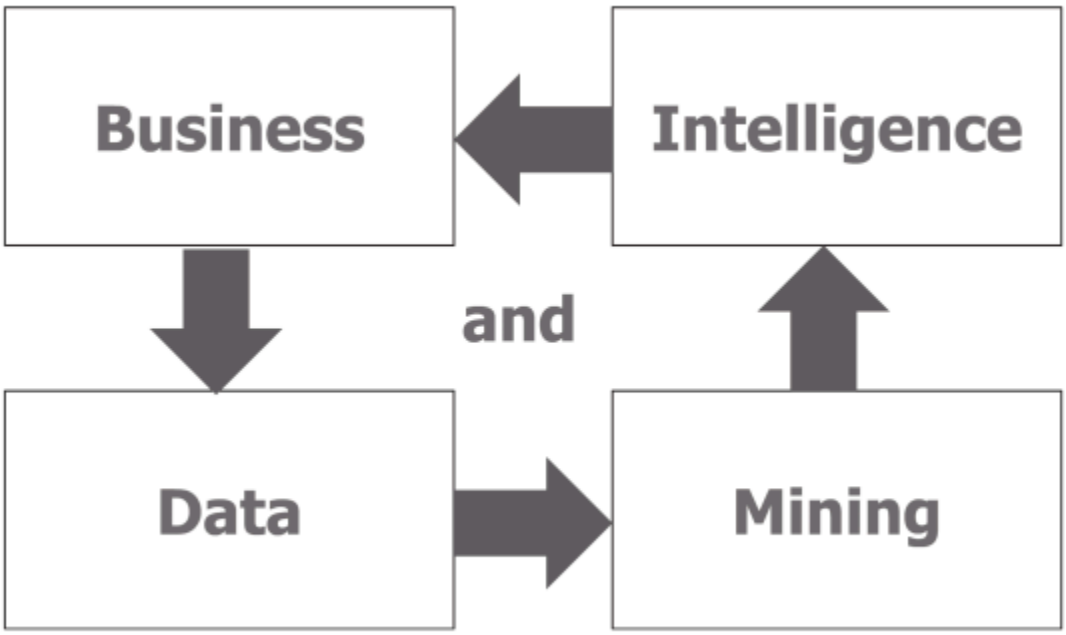


Figure 1.1 Business intelligence and data mining cycle

Data Processing

Figure 1.2 Data processing chain

Sample Data file

Movies Transaction Database				
Order #	Date sold	Product name	Location	Total value
1	April 2013	Monty Python	United States	$9
2	May 2013	Gone With the Wind	United States	$15
3	June 2013	Monty Python	India	$9
4	June 2013	Monty Python	United Kingdom	$12
5	July 2013	Matrix	United States	$12
6	July 2013	Monty Python	United States	$12
7	July 2013	Gone With the Wind	United States	$15
8	Aug 2013	Matrix	United States	$12
9	Sept 2013	Matrix	India	$12
10	Sept 2013	Monty Python	United States	$9
11	Sept 2013	Gone With the Wind	United States	$15
12	Sept 2013	Monty Python	India	$9
13	Nov 2013	Gone With the Wind	United States	$15
14	Dec 2013	Monty Python	United States	$9
15	Dec 2013	Monty Python	United States	$9

Data mining platforms

Table 4.1 Comparison of popular data mining platforms

Feature	Excel	IBM SPSS Modeler	Weka
Ownership	Commercial	Commercial, expensive	Open-source, free
Data mining features	Limited, extensible with add-on modules	Extensive features, unlimited data sizes	Extensive, performance issues with large data
Stand-alone	Stand-alone	Embedded in BI software suites	Stand-alone
User skills needed	End users	Skilled BI analysts	Skilled BI analysts
User interface	Select and click, easy	Drag-and-drop use, colorful, beautiful GUI	GUI, mostly b&w text output
Data formats	Industry standard	Variety of data sources accepted	Proprietary

Data mining cycle

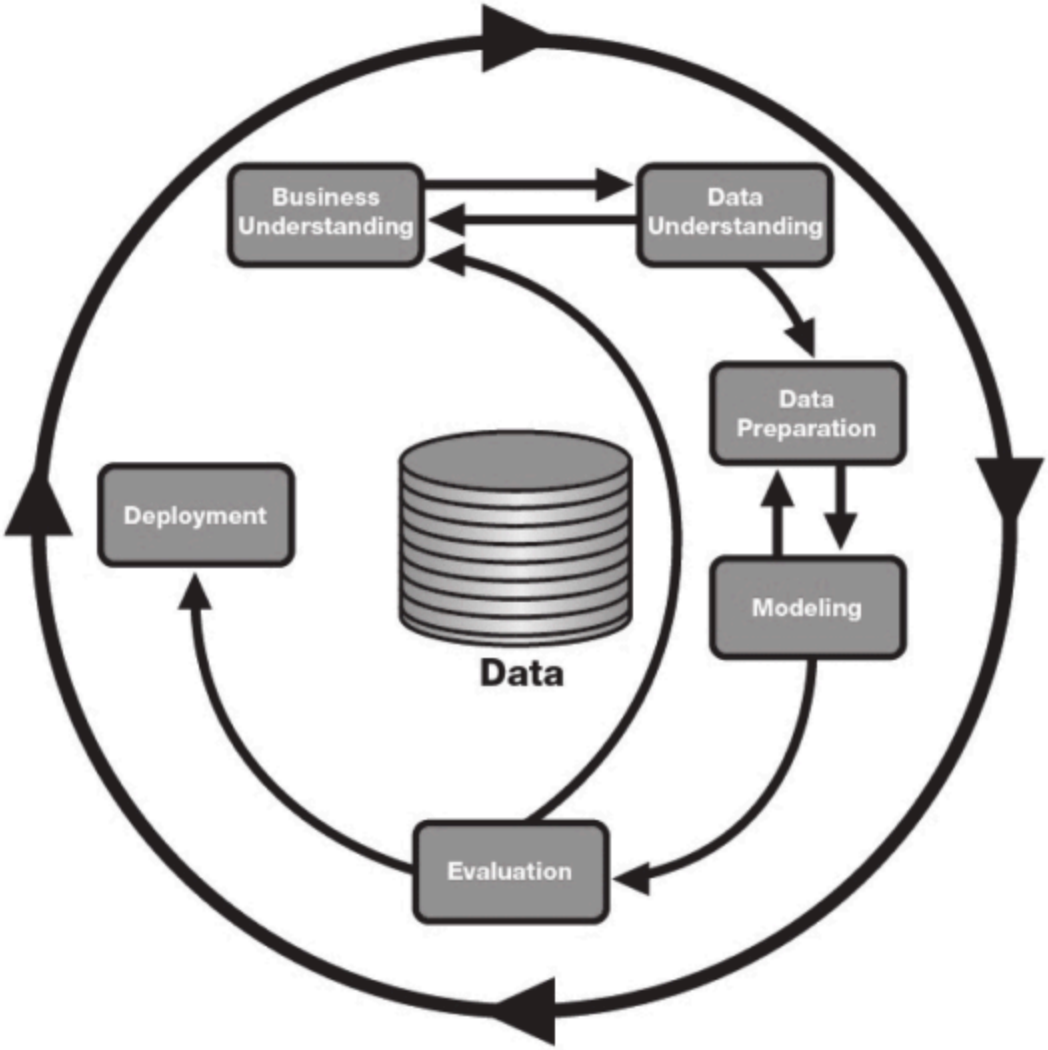


Figure 4.3 CRISP-DM data mining cycle

Figure 1.1: Data Warehouse Concept

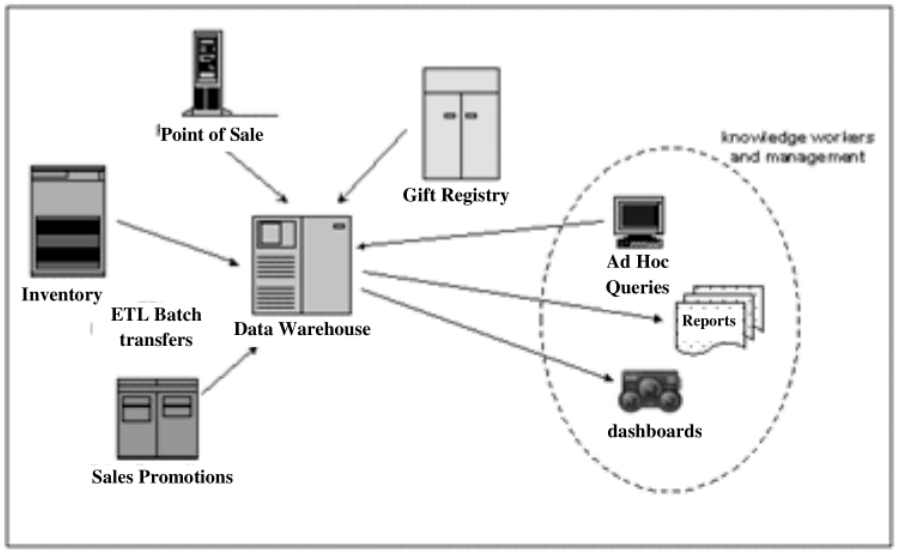
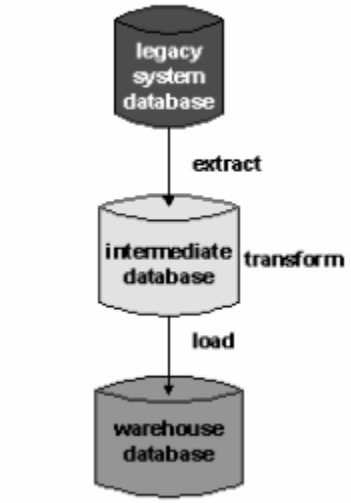
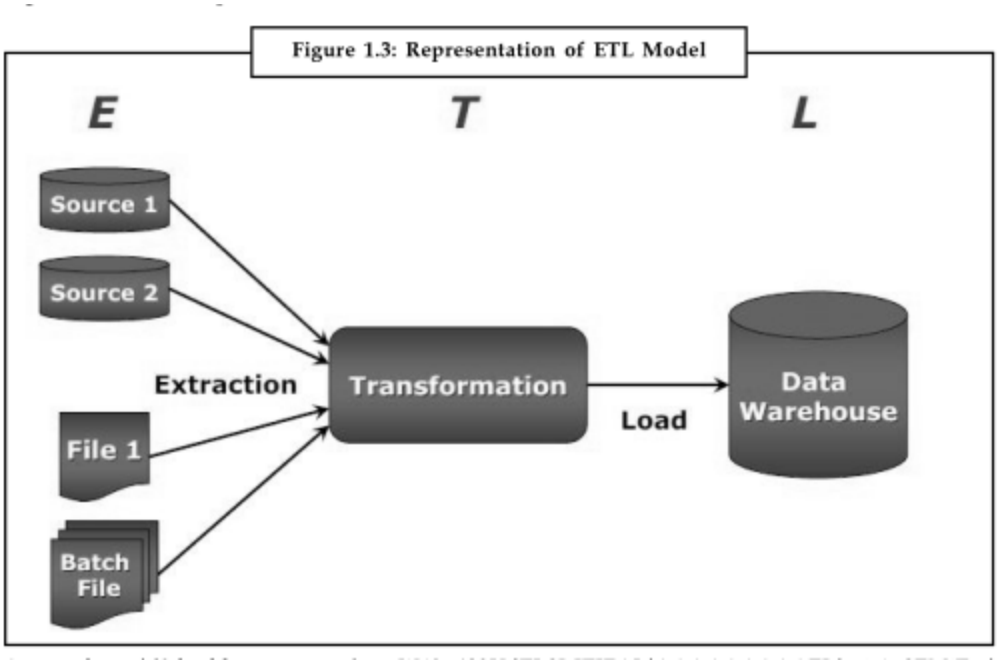


Figure 1.2: Extract/Transform/Load Structure



ETL – Extract/Transofrm/Load



Information Systems Support for Decision Making

Information systems play a critical role in helping organizations make decisions. These systems gather, analyze, and present data, helping leaders make choices at all levels—whether for day-to-day operations, tactical plans, or long-term strategies.

Example: A company like Walmart uses its information system to manage inventory. The system tracks real-time sales in its stores and predicts what needs restocking. By analyzing customer buying habits, it helps make decisions about promotions, supply chain adjustments, and managing stock during different seasons.

Early Computerized Decision Support Systems

In the 1960s, the first computerized decision support systems were developed to provide managers with regular reports. Over time, these systems evolved into more sophisticated Decision Support Systems (DSS), capable of analyzing complex data to help in decision-making.

Example: In the 1970s, American Airlines created SABRE, the first computerized reservation system. It allowed travel agents to book flights in real-time, helping the airline make better decisions about flight schedules, pricing, and seat availability.

Decision Support Systems (DSS) Explained

A Decision Support System (DSS) helps people make complex decisions by combining data, analysis tools, and user-friendly interfaces. DSS can handle semi-structured or unstructured situations where traditional systems fall short.

Example: In healthcare, a DSS can assist doctors in diagnosing diseases. The doctor enters the patient's symptoms, medical history, and test results, and the DSS compares this data with past cases to suggest possible diagnoses, helping the doctor make a more informed decision.

Business Intelligence (BI) Framework

Business Intelligence (BI) refers to the technologies and strategies businesses use to analyze data and make decisions. The BI process includes collecting, integrating, analyzing, and reporting data, helping businesses make smarter choices.

Example: Netflix uses BI tools to analyze user data, like viewing history and ratings, to recommend personalized content to each viewer. This helps keep users engaged and improves their overall experience.

Business Analytics (BA)

Business Analytics (BA) involves using statistical methods, data mining, and predictive modeling to analyze data and gain insights. BA helps companies make better decisions by predicting future trends and outcomes.

Example: Amazon uses predictive analytics in its supply chain to forecast product demand. By analyzing past sales, seasonal trends, and customer preferences, Amazon's system predicts which products will be in high demand, allowing it to adjust its inventory.

Big Data Analytics

Big Data Analytics focuses on analyzing massive and complex datasets that traditional tools can't handle. Companies use big data to find patterns, understand customer preferences, and spot market trends, leading to better decision-making.

Example: Uber uses big data analytics to predict supply and demand in different areas at different times. By analyzing data from past rides, traffic, weather, and events, Uber adjusts its pricing (surge pricing) to ensure drivers are available when needed.

The Decision-Making Process

Decision-making is the process of choosing the best option from several alternatives to achieve a goal. It involves gathering information, analyzing options, and making a final choice based on desired outcomes.

Example: A marketing team at Coca-Cola may need to decide which product to promote. They analyze data on sales, customer preferences, and competitors' strategies before choosing an advertising campaign for the most profitable product.

Phases of the Decision-Making Process

Example 1 :
Intelligence Phase: Identify the problem or opportunity and gather data to understand it.

- **Example**: A tech company realizes its product sales have dropped. They collect data on customer reviews, competitor products, and market trends to understand why.

Design Phase: Develop possible solutions or alternatives to solve the problem.

- **Example**: The tech company considers improving product features, lowering the price, or launching a new marketing campaign.

Choice Phase: Evaluate the alternatives and choose the best one.

- **Example**: After analyzing costs and potential benefits, the company decides to launch a new marketing campaign targeting younger customers.

Implementation Phase: Put the chosen solution into action.

1. **Example**: The tech company runs the marketing campaign on social media and monitors its impact on sales and customer engagement.

Example 2

2. **Intelligence Phase**: Identify the problem or opportunity and gather data to understand it.
    - **Example**: A bank notices customers leaving and collects data on feedback, transactions, and competitors to find out why.
3. **Design Phase**: Develop possible solutions or alternatives to solve the problem.
    - **Example**: The bank may consider offering better interest rates, loyalty programs, or improved customer service.
4. **Choice Phase**: Evaluate the alternatives and choose the best one.

    - **Example**: After comparing options, the bank decides to introduce a loyalty program to reduce customer churn.
5. **Implementation Phase**: Put the chosen solution into action.
    - **Example**: The bank rolls out the loyalty program and integrates it into its systems to track customer participation.

Capabilities of Decision Support Systems (DSS)

DSS have several features that help decision-makers:

- **Data Access**: Pull data from different sources.
- **Simulation Models**: Test different scenarios and predict outcomes.
- **What-If Analysis**: Change variables to see how they impact results.
- **Visualization Tools**: Present data visually using charts, graphs, and dashboards.

Example: FedEx uses DSS to optimize delivery routes. The system simulates various factors like weather and traffic, suggesting the most efficient routes to reduce costs and ensure timely delivery.

Types of Decision Support Systems

- **Communication-driven DSS**: Helps people collaborate and make decisions together.
    - **Example**: Teams use video conferencing tools like Microsoft Teams, along with project management dashboards, to make group decisions.
- **Data-driven DSS**: Focuses on analyzing large datasets.
    - **Example**: A bank uses a DSS to detect fraud by analyzing transaction data.
- **Model-driven DSS**: Uses mathematical models to simulate decision outcomes.
    - **Example**: Airlines use model-driven DSS to optimize flight schedules and seating based on demand forecasts.
- **Document-driven DSS**: Manages and retrieves unstructured information.
    - **Example**: A law firm uses this type of DSS to search through legal documents for important case information.
- **Knowledge-driven DSS**: Uses expert systems to provide decision-makers with specialized knowledge.
    - **Example**: IBM Watson offers doctors diagnosis suggestions based on a vast amount of medical literature and case studies.

Components of a Decision Support System

1. **Database Management System (DBMS)**: Stores and retrieves data.
    - **Example**: A sales team uses a DBMS to store customer purchase histories, allowing the DSS to analyze trends.
2. **Model Management System**: Offers tools like optimization and simulation models for decision-making.

    - **Example**: A manufacturer uses this system to simulate how increasing production affects costs and profits.
3. **User Interface**: The platform that users interact with.
    - **Example**: A hospital uses a user-friendly interface where doctors can input symptoms and get diagnostic suggestions.
4. **Knowledge Base**: Stores rules, best practices, and historical information for decision-making.
    - **Example**: A consulting firm uses a knowledge base of project management best practices to guide its decision-making process.

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