Dr Nourhane groun nourhane.groun@univ-biskra.dz

Business Intelligence & Organizational Competitiveness

Lectures 04 & 08

lecture 4: Geographic Information Systems (GIS)

lecture 5: Data Mining

lecture 6: Business Process Management (BPM)

lecture 7: Knowledge Management Systems (KMS)

lecture 8: Neural Networks & Decision Trees (NN & DT)

lecture 4: Geographic Information Systems (GIS)

Definition:

Geographic Information Systems (GIS) are systems that collect, store, analyze, and display geographic and spatial data. They help to understand relationships between locations and phenomena, whether natural or human-made.

Focuses on analyzing spatial and geographic data and linking it with administrative or economic information.

Examples: Interactive maps, city planning, natural resource management, studying population and facility distribution.

Key Components:

1. **Spatial Data:** Includes maps, satellite images, aerial photos, roads, rivers, land use, and elevation.
2. **Analysis Tools:** GIS can analyze distances, patterns, and relationships, such as:
   - Optimal locations for building hospitals or schools.
   - Studying population density versus resource distribution.
   - Mapping areas prone to floods or environmental risks.
3. **Visualization:** GIS allows presenting data in maps, charts, or interactive dashboards, making complex information easier to understand.
4. **Data Management:** Stores large amounts of spatial and non-spatial information in an organized way for easy access.

Applications / Examples:

- **Urban Planning:** Mapping city zones, planning roads and public facilities.
- **Environmental Management:** Tracking forests, water resources, and pollution.
- **Business Applications:** Retail store location analysis, logistics planning.
- **Public Health:** Mapping disease outbreaks to plan medical interventions.

Benefits:

- Better decision-making based on location and data.
- Efficient resource management.
- Clear visualization of complex data

lecture 5: Data Mining

Definition:
Data Mining is the process of extracting useful patterns, trends, and knowledge from large datasets. It goes beyond simple data analysis by uncovering hidden relationships and insights that are not immediately obvious.

Specializes in extracting patterns and hidden information from large amounts of data. **Uses:** Analyzing customer behavior, predicting trends, discovering relationships between data.

Key Concepts:

Patterns and Relationships: Data mining can find correlations, sequences, clusters, and anomalies in data.

Data Preparation: Cleaning and organizing data is essential before mining to ensure accurate results.

Techniques:

- **Classification:** Sorting data into predefined categories (e.g., high-risk vs. low-risk customers).
- **Clustering:** Grouping similar items without predefined categories (e.g., customer segmentation).
- **Association Rules:** Discovering patterns in data (e.g., people who buy bread often buy milk).
- **Regression Analysis:** Predicting future trends based on historical data.

Applications / Examples:

- **Business:** Predicting customer behavior, sales forecasting, market basket analysis.
- **Healthcare:** Detecting disease patterns, predicting outbreaks.
- **Finance:** Fraud detection, credit scoring.
- **Education:** Identifying students at risk, personalizing learning paths.

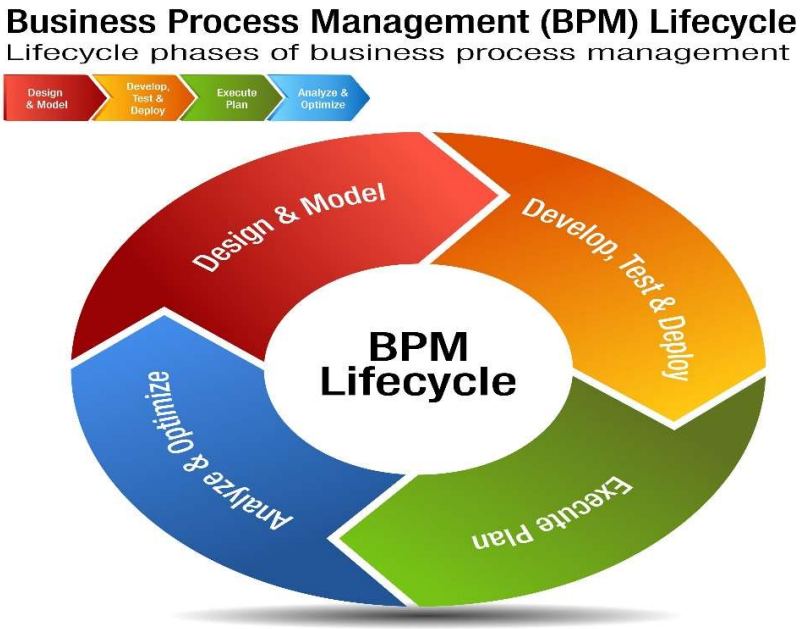
Benefits:

- Helps make data-driven decisions.
- Reveals hidden patterns that improve business or organizational performance.
- Supports predictive analysis and strategic planning

lecture 6: Business Process Management (BPM)

Definition: Business Process Management (BPM) is a systematic approach to making an organization's workflow more effective, more efficient, and more capable of adapting to an ever-changing environment. It involves discovering, modeling, analyzing, measuring, and improving business processes.

Focuses on improving business processes and measuring their performance using management systems and methods.
Goal: Increase efficiency, reduce waste, and improve service quality.



Key Components:

1. **Process Modeling:** Creating a visual representation of how a process currently works to identify gaps or delays.
2. **Automation:** Using technology to perform repetitive tasks, reducing human error and speeding up the workflow.
3. **Performance Monitoring:** Tracking processes using Key Performance Indicators (KPIs) to ensure they meet quality standards.
4. **Optimization:** Continuously refining processes to eliminate waste, reduce costs, and improve output.

Benefits:

- Enhanced productivity and reduced operational costs.
- Greater organizational agility and faster response to market changes.
- Improved service quality and customer satisfaction.

lecture 7: Knowledge Management Systems (KMS)

Definition: Knowledge Management Systems (KMS) refer to IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage, retrieval, transfer, and application.

Deals with managing knowledge and information within an organization and making it easy to access and share.

Deals with capturing, distributing, and effectively using knowledge within an organization.

Examples: Knowledge management systems, organizational databases, decision support systems.

Key Concepts:

1. **Explicit Knowledge:** Information that is easily codified and documented (e.g., manuals, reports, and databases).
2. **Tacit Knowledge:** Personal experience and "know-how" stored in employees' minds, which is harder to formalize.
3. **Knowledge Repositories:** Centralized digital libraries where employees can store and access best practices and "lessons learned."

Benefits:

- Prevents "knowledge loss" when experienced employees leave.

- Promotes innovation through the free flow of ideas.
- Reduces training time and improves decision-making accuracy.

lecture 8: Neural Networks & Decision Trees (NN & DT)

Relates to artificial intelligence and predictive analysis.

- **Neural Networks (NN):** Simulate how the human brain learns.
- **Decision Trees (DT):** Used to make structured decisions based on specific data.

Foundational tools in Artificial Intelligence used for advanced data analysis and automated decision-making.

1. Neural Networks (NN):

- Definition: Computing systems inspired by the biological neural networks of animal brains. They consist of layers of interconnected "nodes" that learn to perform tasks by considering examples.
- Usage: Image and speech recognition, financial market trend analysis, and autonomous vehicles.

2. Decision Trees (DT):

- Definition: A decision-support tool that uses a tree-like model of decisions and their possible consequences. It provides a clear, structured path for classification and prediction.
- Usage: Credit scoring, medical diagnosis, and customer churn prediction.

Core Concepts:

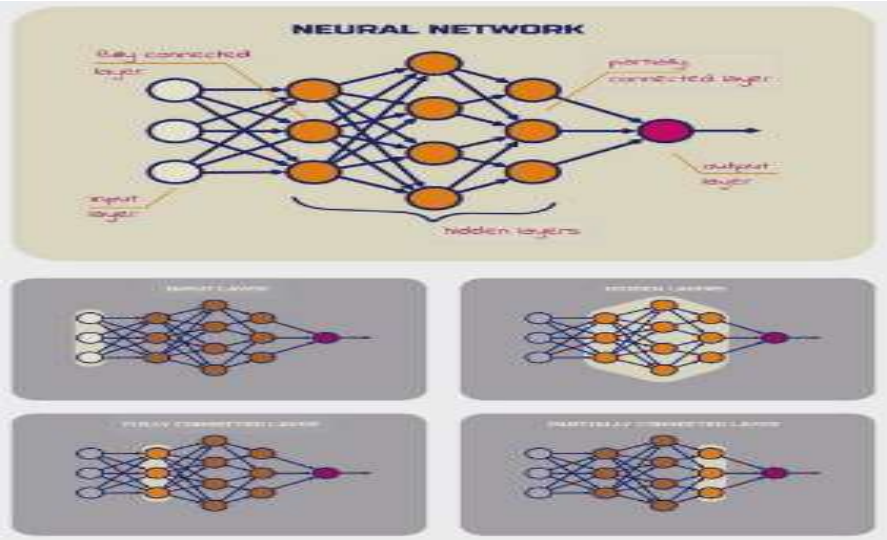
1. Machine Learning: The ability of these models to improve their performance as they are exposed to more data.
2. Predictive Analytics: Using historical data to forecast future outcomes with high precision.
3. Pattern Recognition: Identifying complex trends within massive datasets that are invisible to the human eye.

Benefits:

- Ability to process and analyze "Big Data" effectively.
- Elimination of human bias in structured decision-making.

Business Intelligence & Organizational Competitiveness

- Transformation of raw data into actionable strategic insights.



This infographic visually explains the components of a neural network. A neural network is a computational model inspired by the human brain, used in machine learning to recognize patterns. The diagram illustrates the different layers and connections within a simple neural network.