

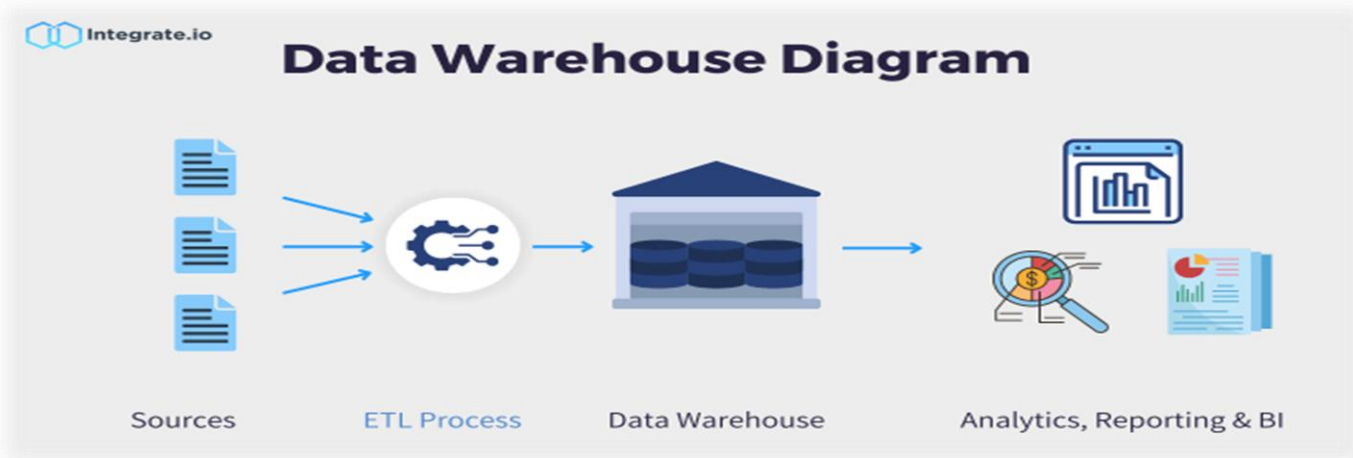
# Unit 4

## **Unit 4: Applications of Data Warehousing and Data Mining in Government (6 Hrs.)**

Introduction; National Data Warehouses - Census Data, Prices of Essential Commodities; Other Areas for Data Warehousing and Data Mining – Agriculture, Rural Development, Health, Planning, Education, Commerce and Trade, Other Sectors

# DATA WAREHOUSING AND DATA MINING IN GOVERNMENT

## Data Warehousing



- ▶ A data warehouse is a type of **data management system** that is designed to enable and **support business intelligence (BI)** activities, especially analytics. Data warehouses are solely intended to perform queries and analysis and often contain large amounts of historical data.

- ▶ Data warehousing plays an important role in e-governance by providing government organizations with a centralized repository for data that can be used to support decision-making and improve government services.
- ▶ With a data warehouse in place, government organizations can easily access and analyze data from a variety of sources, such as citizen feedback, demographic data, and performance metrics, to inform their policies and initiatives
- ▶ For example, a data warehouse can be used to store and analyze data related to the delivery of government services, such as healthcare or education.
- ▶ This information can then be used to identify areas for improvement and track progress over time. Similarly, data warehousing can be used to analyze data related to public safety, such as crime statistics, to inform policing strategies and improve public safety.

# Data Mining

- ▶ Data mining is a process used by government organizations to extract valuable insights and patterns from large amounts of data.



- ▶ By using advanced statistical techniques and algorithms, data mining can help government organizations to identify trends, patterns, and relationships in their data that can inform decision-making and improve government services.
- ▶ For example, data mining can be used to analyze data related to citizen feedback and engagement, such as survey responses or social media posts, to identify areas for improvement in government services. This information can then be used to inform policy decisions and allocate resources more effectively. Similarly, data mining can be used to analyze data related to public safety, such as crime statistics, to inform policing strategies and improve public safety.

# Data warehousing Vs Data Mining

BASIS	DATA WAREHOUSING	DATA MINING
Definition	A huge database which is designed to carry out analytical processes and not transactional application	It is a process of determining hidden relationships and patterns between different sets of data
Meaning	It combines huge sets of related data	It derives useful meaning and insights from a large set of data
Application	Extremely large quantities of data of any organization can be easily stored	It is carried out for the purpose of identifying patterns, relationships and frauds in an organization
Implementation	Before data mining as the data is compiled and stored here in a common database	After warehousing in order to withdraw useful insights
Benefits	Timely data access, enhanced response time and provides consistent data for easy access	Helpful to predict trends, market analysis, financial analysis and recognizing fraudulent
Performed by	Can be performed by engineers	Performed by businessmen with the help of engineers



## National Data Warehouse

- ▶ A National Data Warehouse is a centralized repository of data that is collected, managed, and made available for analysis and dissemination by a government agency.
- ▶ The main objective of a National Data Warehouse is to provide a single source of reliable and comprehensive data that can be used for policy-making, planning, and decision-making purposes.
- ▶ A National Data Warehouse can have several applications in various sectors, including:

**Government and Public Policy:** The data stored in a National Data Warehouse can be used by government agencies and policy-makers to inform policy decisions and evaluate the effectiveness of existing policies.

**Healthcare:** The data stored in a National Data Warehouse can be used by healthcare organizations and researchers to analyze health trends, identify health disparities, and evaluate the effectiveness of healthcare interventions.

**Education:** The data stored in a National Data Warehouse can be used by education institutions and policy-makers to monitor student achievement, evaluate the effectiveness of educational programs, and inform policy decisions.

**Business and Economics:** The data stored in a National Data Warehouse can be used by businesses and economists to analyze economic trends, identify opportunities for growth, and inform investment decisions.

**Environmental Science:** The data stored in a National Data Warehouse can be used by environmental scientists and policymakers to monitor environmental trends, evaluate the impact of environmental policies, and inform decision-making on environmental issues.



## Census Data

- ▶ Census data refers to a collection of information about a population, typically conducted by a government agency, that provides a detailed picture of the demographic, social, economic, and housing characteristics of a population.
- ▶ Census data is collected through surveys and questionnaires, and is used to analyze population trends, identify disparities and inequalities, and inform policy decisions.
- ▶ Census data is a valuable resource for researchers, policymakers, businesses, and other stakeholders, as it provides a comprehensive and representative picture of the population.

# DATA WAREHOUSING AND DATA MINING IN AGRICULTURE

Data warehousing and data mining techniques can be applied in the agriculture industry to improve decision-making and enhance the efficiency of agricultural operations. The use of data warehousing and data mining in agriculture can help to:

- ▶ **Improve crop yields:** By analyzing data related to weather patterns, soil conditions, and other environmental factors, farmers can make informed decisions about planting, fertilizing, and harvesting crops, leading to improved crop yields.
- ▶ **Enhance animal husbandry:** Data warehousing and data mining can be used to track the health, growth, and productivity of livestock, helping farmers to identify patterns and trends that can improve animal husbandry practices.

- ▶ **Optimize resource allocation:** By analyzing data related to resources such as water, fertilizer, and energy, farmers can make informed decisions about resource allocation, leading to more efficient and cost-effective agricultural operations.
- ▶ **Improve supply chain management:** Data warehousing and data mining can be used to track and analyze data related to the production, processing, and distribution of agricultural products, helping to improve supply chain management and reduce waste.
- ▶ **Facilitate market analysis:** Data warehousing and data mining can be used to analyze market trends and consumer behavior, helping farmers to make informed decisions about what to produce and how to price their products.

## DATA WAREHOUSING AND DATA MINING IN RURAL DEVELOPMENT

Data warehousing and data mining techniques can play a significant role in promoting rural development by providing valuable insights into the needs, challenges, and opportunities in rural communities.

The use of data warehousing and data mining in rural development can help to:

- ▶ **Identify areas of need:** By analyzing data related to socio-economic indicators, such as poverty rates, access to education, and employment opportunities, decision-makers can identify areas of need and allocate resources to support rural development initiatives.
- ▶ **Improve access to services:** Data warehousing and data mining can be used to track and analyze data related to access to basic services such as healthcare, education, and clean water, helping to identify areas where access is lacking and prioritize investments in these areas.
- ▶ **Monitor and evaluate development programs:** Data warehousing and data mining can be used to monitor and evaluate the impact of development programs, allowing decision-makers to make informed decisions about the allocation of resources and identify areas for improvement.

# DATA WAREHOUSING AND DATA MINING IN HEALTH

Data warehousing and data mining techniques can play an important role in improving the health outcomes of individuals and populations.

Some of the ways in which data warehousing and data mining can be applied in health include:

- ▶ **Electronic health records:** Data warehousing can be used to store and manage large amounts of health-related data, including electronic health records, laboratory results, and imaging studies. This data can be analyzed to improve patient outcomes and support clinical decision-making.
- ▶ **Population health management:** By analyzing large amounts of health-related data, data mining techniques can be used to identify patterns and trends in health outcomes and support population health management initiatives.
- ▶ **Predictive modeling:** Data warehousing and data mining can be used to develop predictive models to identify individuals at high risk of certain health conditions and target interventions to improve health outcomes.
- ▶ **Drug development:** Data warehousing and data mining can be used to support drug development by analyzing large amounts of data related to the efficacy, safety, and effectiveness of new and existing drugs.
- ▶ **Clinical trials:** Data warehousing and data mining can be used to support clinical trials by storing, managing, and analyzing data related to the safety and efficacy of new treatments and therapies.
- ▶ **Epidemiology:** Data warehousing and data mining can be used to support epidemiological research by storing, managing, and analyzing large amounts of health-related data, including demographic, environmental, and lifestyle information, to identify patterns and trends in disease prevalence and risk factors.

## Data warehousing and data mining in planning

Data warehousing and data mining techniques can be applied in the field of planning to support decision-making and improve the efficiency and effectiveness of planning initiatives. Some of the ways in which data warehousing and data mining can be applied in planning include:

- ▶ **Predictive analysis of land use patterns:** By analyzing data related to land use patterns, including demographic, economic, and environmental data, planners can use predictive analysis techniques to forecast trends and identify areas where support is needed to promote sustainable development.
- ▶ **Urban planning and design:** Data warehousing and data mining can be used to store and analyze data related to urban planning and design, including demographic data, transportation data, and environmental data, helping to inform the development of urban plans that are responsive to the needs of communities.
- ▶ **Infrastructure planning:** Data warehousing and data mining can be used to track and analyze data related to the construction, maintenance, and use of infrastructure, helping to inform the development of infrastructure plans and improve the efficiency of infrastructure projects.
- ▶ **Disaster risk reduction:** By analyzing data related to disaster risk and vulnerability, including data on weather patterns, land use patterns, and population density, planners can use data warehousing and data mining techniques to identify areas at high risk of natural disasters and target interventions to reduce risk and improve disaster preparedness.
- ▶ **Environmental planning:** Data warehousing and data mining can be used to store and analyze data related to environmental planning, including data on land use patterns, water resources, and air and water quality, helping to inform the development of environmental plans and improve environmental outcomes.

## Data warehousing and data mining in education

- ▶ Data warehousing and data mining techniques can play an important role in the field of education, helping to improve the quality of education and support student success. Some of the ways in which data warehousing and data mining can be applied in education include:
- ▶ **Student assessment:** Data warehousing and data mining can be used to store and analyze data related to student assessment, including **test scores**, **grades**, and **attendance** records, helping to identify areas of strengths and weaknesses and inform teaching and learning strategies.
- ▶ **Personalized learning:** By analyzing data related to student learning, including learning style, motivation, and progress, data warehousing and data mining can support the development of personalized learning experiences that meet the individual needs of each student.
- ▶ **Program evaluation:** Data warehousing and data mining can be used to store and analyze data related to educational programs, including data on **program effectiveness**, **student satisfaction**, and **program outcomes**, helping to inform program evaluation and improvement efforts.



- ▶ **Teacher effectiveness:** Data warehousing and data mining can be used to store and analyze data related to teacher effectiveness, including data on student performance, teacher feedback, and classroom observations, helping to identify areas for improvement and support teacher development.
- ▶ **Student retention:** Data warehousing and data mining can be used to store and analyze data related to student retention, including data on student attendance, academic performance, and engagement, helping to identify students at risk of dropping out and target interventions to support student success.
- ▶ **Predictive analytics:** Data warehousing and data mining can be used to develop predictive models to identify students at risk of poor academic performance and target interventions to support student success.

## DATA WAREHOUSING AND DATA MINING IN TRADE AND COMMERCE

Data warehousing and data mining techniques can play a significant role in the field of trade and commerce, helping organizations to better understand market trends and make informed business decisions. Some of the ways in which data warehousing and data mining can be applied in trade and commerce include:

- ▶ **Market analysis:** Data warehousing and data mining can be used to store and analyze data related to market trends, including data on sales, customer behavior, and market competition, helping organizations to better understand market dynamics and make informed business decisions.
- ▶ **Customer relationship management:** Data warehousing and data mining can be used to store and analyze customer data, including data on customer behavior, preferences, and feedback, helping organizations to develop targeted marketing strategies and improve customer relationships.

- ▶ **Supply chain management:** Data warehousing and data mining can be used to store and analyze data related to supply chain operations, including data on inventory levels, supplier performance, and shipping and transportation data, helping organizations to improve supply chain efficiency and reduce costs.
- ▶ **Predictive analytics:** Data warehousing and data mining can be used to develop predictive models to forecast future sales trends, customer behavior, and market dynamics, helping organizations to make informed business decisions and stay ahead of the competition.
- ▶ **Fraud detection:** Data warehousing and data mining can be used to store and analyze data related to financial transactions, helping organizations to detect fraudulent activity and improve security.

# Thank You !