Table of Contents

Introduction

Chapter 1: Introduction to Data Mining

- 1.1 Definition of Data Mining
 - Techniques used for Data Mining
- 1.2 How Does Data Mining Work?
- 1.3 Architecture of Data Mining
- 1.4 Kinds of Data that can be Mined
- 1.5 Data Mining Functionalities
- 1.6 Types of Data Mining Systems
- 1.7 Advantages of Data Mining
- 1.8 Disadvantages of Data Mining
- 1.9 Ethical Issues in Data Mining Summary
 - Review Exercise
 - Multiple Choice Questions
 - **Descriptive Questions**

Chapter 2: Data Exploration

2.1 Data

Types of Attributes of Data Statistical Description of Data

- 2.2 Data Visualization
 - Visualization Techniques
 - Measuring Similarity and Dissimilarity in Data
 - Summary
 - **Review Exercise**
 - Multiple Choice Questions
 - **Descriptive Questions**

Chapter 3: Data Preprocessing

- 3.1 Why Preprocessing?
- 3.2 Data Cleaning Missing Values Noisy Data
 - Data Cleaning as a Process
- 3.3 Data Integration
- 3.4 Data Reduction
 - Data Cube Aggregation Attribute Subset Selection Dimensionality Reduction Numerosity Reduction
- 3.5 Data Transformation Normalization
- 3.6 Data Discretization and Concept Hierarchy Generation Binning
 - Histogram Analysis
 - Summary
 - **Review Exercise**
 - Multiple Choice Questions
 - **Descriptive Questions**

Chapter 4: Classification

- 4.1 Basic Concepts Data Preparation
 - Data Types
- 4.2 Classification Methods
 Decision Tree Induction
 Decision Tree Algorithm
 Bayesian Classification
 Other Classification Methods
- 4.3 Prediction Structure of Regression Model Simple Linear Regression

Multiple Linear Regression (Multivariable Linear Regression) Nonlinear Regression

4.4 Model Evaluation and Selection

Accuracy and Error Measures

Holdout

Random Sampling

- **Cross-Validation**
- Bootstrap
- Comparing Classifier Performance Using ROC Curves
- 4.5 Combining Classifiers (Ensemble Methods)
 - Bagging
 - Boosting
 - **Random Forests**
 - Summary
 - **Review Exercise**
 - **Multiple Choice Questions**
 - **Descriptive Questions**

Chapter 5: Clustering

- 5.1 Introducing Cluster AnalysisRequirements of a Good Clustering AlgorithmTypes of Data in Clustering
- 5.2 Clustering Methodologies
 - Partitioning Methods
 - Hierarchical Methods
 - **Density-Based Clustering**
 - Summary
 - **Review Exercise**
 - **Multiple Choice Questions**
 - **Descriptive Questions**

Chapter 6: Outlier Analysis

- 6.1 Real-World Applications
- 6.2 Types of Outliers
- 6.3 Outlier Challenges
 Noise versus Outliers
 Issues with Multivariate Outlier Detection
 Issues with Multiple Outliers
 - Choice of Appropriate Model
- 6.4 Outlier Detection Approaches
- 6.5 Outlier Detection Methods Various Application Scenarios for Outlier Detection Methods
- 6.6 Proximity-Based Outlier Analysis Distance-Based Approach Density-Based Clustering
- 6.7 Clustering-Based Outlier Analysis
 Summary
 Review Exercise
 Multiple Choice Questions
 Descriptive Questions

Chapter 7: Frequent Pattern Mining

- 7.1 Market Basket Analysis
 - Frequent Itemsets, Closed Itemsets, and Association Rules Frequent Pattern Mining Technique
- 7.2 Efficient and Scalable Frequent Itemset Mining Methods
 Apriori Algorithm for Finding Frequent Itemsets using Candidate Generation
 Generating Association Rules from Frequent Itemsets
 Improving Efficiency of Apriori Algorithm
 A Pattern Growth Approach for Mining Frequent Itemsets
 Mining Frequent Itemsets Using VDFs
 Mining Closed and Maximal Patterns
- 7.3 Mining Multilevel and Multidimensional Association Rules
- 7.4 Association Mining to Correlation Analysis

Pattern Evaluation Measures

Constraint-Based Association Mining

Summary

Review Exercise

Multiple Choice Questions

Descriptive Questions

Chapter 8: Introduction to Business Intelligence

- 8.1 Data, Information, and Knowledge
- 8.2 Defining Business Intelligence
- 8.3 Important Factors in Business Intelligence
- 8.4 Business Intelligence Architecture
- 8.5 Business Intelligence Framework
 Business Intelligence Framework 2020
 DB2 Framework for BI
- 8.6 Role of Mathematical Models in BI
- 8.7 Factors Responsible for a Successful BI Project
- 8.8 Development of BI System
- 8.9 Obstacles to Business Intelligence in an Organization
- 8.10 Ethics and Business Intelligence
 - Summary
 - **Review Exercise**
 - **Multiple Choice Questions**
 - **Descriptive Questions**

Chapter 9: Decision Support System

- 9.1 Concept of Decision Making Types of decisions Decision-making process
 - Decision making process
- 9.2 Techniques of Decision Making
- 9.3 Understanding Decision Support System (DSS)
- 9.4 Evolution of Information System
- 9.5 Development of Decision Support System

DSS Development Issues

Decision-Oriented Diagnosis

viii Table of Contents

Feasibility Study Selection of a Development Approach

- 9.6 Application of DSS
- 9.7 Role of Business Intelligence in Decision Making Summary
 - **Review Exercise**

Multiple Choice Questions

Descriptive Questions

Chapter 10: BI and Data Mining Applications

- 10.1 ERP and Business Intelligence Implementation of an ERP System
- 10.2 BI Applications in CRM Application of a Cost-Effective CRM System
- 10.3 BI Applications in Marketing Marketing Models Relationship Marketing Sales Force Management
- 10.4 BI Applications in Logistics and Production
 - Logistics Model
 - Supply Chain Optimization
 - Optimization Models for Logistics Planning
 - **Revenue Management Systems**
 - Business Intelligence in Logistics and Supply Chain Management
- 10.5 Role of BI in Finance
 - Meaning of Finance
 - **BI** Applications in Finance
 - **Financial Reporting**
 - **Financial Planning**
 - Financial Analysis
- 10.6 BI Applications in Banking
- 10.7 BI Applications in Telecommunications
- 10.8 BI Applications in Fraud Detection
- 10.9 BI Applications in Clickstream Mining

10.10 BI Applications in the Retail Industry
 Summary
 Review Exercise
 Multiple Choice Questions
 Descriptive Questions

Practicals

Index