Assignment 1
Decision Support Systems (IT445)
Total marks: 5

Due Date: Sat 20th Feb, 2016 (11:59 PM)

Note: All questions carry equal marks.

Q1. List four of Mintzberg's Decisional roles of managers.
Answer:
The 10 roles are divided up into three categories, as follows:

Category	Roles
Interpersonal	Figurehead Leader Liaison
Informational	Monitor Disseminator Spokesperson
Decisional	Entrepreneur Disturbance Handler Resource Allocator Negotiator

Q2. Mention briefly some of the recently popularized concepts and technologies that will play a significant role in defining the future of data warehousing.
Answer:

Sourcing: Is the mechanism by which to obtain important data from multiple sources and it can contain all this things:

- ❖ Web, social media, and Big Data
- ❖ Open source software
- ❖ SaaS (software as a service)
- ❖ Cloud computing

Infrastructure: All things that had a relation with the enhancement of the software and architecture of the hardware and it can include all this things:

- ❖ Columnar
- ❖ Real-time data warehousing
- ❖ Data warehouse appliances
- ❖ Data management technologies and practices
- ❖ In-database processing technology
- ❖ In-memory storage technology
- ❖ New database management systems
- ❖ Advanced analytics

Q3. Managers usually make decisions by following a four-step process. What are the steps?
Answer:

1. Identify the problem .

2. Build a model that describes the problem in the real-world.

3. Define all potential solutions that had a relation to the problem that modeled and then evaluate the proposed solutions.

4. Compare and then select, also recommend the best possible solution to the problem that modeled.

Q4. Computer support can be provided at a broad level, enabling members of whole departments, divisions, or even entire organizations to collaborate online. Name some of the various systems that have evolved from computer support.
Answer:

This support has evolved over the past few years into:

1-Enterprise information systems (EIS)

2- Group support systems (GSS) and includes

- ❖ Enterprise resource management (ERM)
- ❖ Enterprise resource planning (ERP)
- ❖ Supply chain management (SCM)
- ❖ Knowledge management systems (KMS)
- ❖ Customer relationship management (CRM) systems.

Q5. What storage system and processing algorithm were developed by Google for Big Data?
Answer:

Hadoop Distributed File System (HDFS): Provides possible access to data in high-performance through Hadoop clusters. HDFS become an important tool in order to managing and store of big data, in addition to provides the necessary support of analytics applications for the big data .

MapReduce algorithm: A software model, was developed in order to perform calculations simultaneously on a very large amount of data and try to pushing calculations to the data not to the computing node.

Assignment 2
Decision Support Systems (IT445)
Total marks: 5
Due Date: Saturday March 19th 2016 till 11:59 PM

Q.1. **Natural language processing (NLP), a subfield of artificial intelligence and computational linguistics, is an important component of text mining. What is the definition of NLP?**

(0.5 Marks)

Answer: NLP is a discipline that studies the problem of "understanding" the natural human language, with the view of converting depictions of human language into more formal representations in the form of numeric and symbolic data that are easier for computer programs to manipulate.

Q.2. **What are the five steps in the backpropagation learning algorithm?**

(01 Marks)

Answer:
1. Initialize weights with random values and set other parameters.
2. Read in the input vector and the desired output.
3. Compute the actual output via the calculations, working forward through the layers.
4. Compute the errors.
5. Change the weights by working backward from the output layer through the hidden layers.

Q.3. **What is *k*-nearest neighbor (*k*NN) data mining algorithm?**

(01 Marks)

Answer: *k*-NN is a prediction method for classification- as well as regression-type prediction problems. *k*-NN is a type of instance-based learning (or lazy learning) where the function is only approximated locally and all computations are deferred until the actual prediction.

Q.4. **What are the three steps in the process-based approach to the use of support vector machines (SVMs)?**

(0.5 Marks)

Answer:

1. Numericizing the data
2. Normalizing the data
3. Selecting the kernel type and kernel parameters

Q.5. List and briefly describe the six steps of the CRISP-DM data mining process.

(2 Mark)

Answer:
Step 1: Business Understanding - The key element of any data mining study is to know what the study is for. Answering such a question begins with a thorough understanding of the managerial need for new knowledge and an explicit specification of the business objective regarding the study to be conducted.
Step 2: Data Understanding - A data mining study is specific to addressing a well-defined business task, and different business tasks require different sets of data. Following the business understanding, the main activity of the data mining process is to identify the relevant data from many available databases.
Step 3: Data Preparation - The purpose of data preparation (or more commonly called data preprocessing) is to take the data identified in the previous step and prepare it for analysis by data mining methods. Compared to the other steps in CRISP-DM, data preprocessing consumes the most time and effort; most believe that this step accounts for roughly 80 percent of the total time spent on a data mining project.
Step 4: Model Building - Here, various modeling techniques are selected and applied to an already prepared data set in order to address the specific business need. The model-building step also encompasses the assessment and comparative analysis of the various models built.
Step 5: Testing and Evaluation - In step 5, the developed models are assessed and evaluated for their accuracy and generality. This step assesses the degree to which the selected model (or models) meets the business objectives and, if so, to what extent (i.e., do more models need to be developed and assessed).
Step 6: Deployment - Depending on the requirements, the deployment phase can be as simple as generating a report or as complex as implementing a repeatable data mining process across the enterprise. In many cases, it is the customer, not the data analyst, who carries out the deployment steps.

**Assignment 3
Decision Support Systems (IT445)
Total marks: 5
Due Date: 09/04/ 2016 till 11:59 PM**

Q.6. Bring out the similarities and differences between the static and dynamic model categories.

(0.5 Marks)

Answer: **Similarities:**
1. Snapshot of situation.
2. Has state and Time interval

Differences:

S.No	Static model categories	Dynamic model categories
1.	Single snapshot of the situation	Scenarios that change over time
2.	Single interval	Time dependent
3.	Steady state	Represents trends and patterns over time

Q.7. **Describe the Decision Tables with an example and Decision Trees with an example that is not in your study material.** **(1.5 Marks)**

Answer: **Decision Tables** – a tabular representation of the decision situation (alternatives)

Any example

Decision Trees: A Multiple criteria approach with Graphical representation of complex relationships. **Any example**

Q.8. **List and briefly describe the steps of the AHP data mining process with an example that is not in your study material.**

(1.5 Marks)

Answer: **Analytic Hierarchy Process**

It is a very standard method for Multi-Criteria Decision Making developed by Thomas Saaty (1995, 1996) with general tools - ExpertChoice.com and web-based tools - Web-HIPRE (hipre.aalto.fi).

Any example

Step 1: define the goal, criteria, and alternatives

Step 2: the main criteria are then ranked as they relate to the goal

- A comparative ranking scale from 1 to 9 (with ascending order of importance) is used
- The ranking is done using a Pairwise comparison procedure (i.e., divide-and-concur) between any two criteria for all combinations of twos
- The tool readily normalizes the rankings of each of the main criteria over one another to a scale ranging from 0 to 1 and then calculates the row averages to arrive at an overall importance rating ranging from 0 to 1

Step 3: All of the subcriteria related to each of the main criteria are then ranked with their relative importance over one another

Step 4: Each alternative is ranked with respect to all of the subcriteria that are linked with the alternatives in a similar fashion using the relative scale of 0–9; then the overall importance of each alternative is calculated

Step 5: The final result are obtained from the composite priority analysis involving all the subcriteria and main criteria.

Q.9. **Analyze the Problem-Solving Search Methods.** **(1.5 Marks)**

Answer:

Search is choice phase of decision making.
Search is the process of identifying the best possible solution / course of action [under limitations such as time, …]
Search techniques include
- Optimization or analytical techniques – Generate the improved solutions or get the best solution directly and stop when no improvement is seen.
- Algorithms - Finds good enough feasible solutions to complex problems
- Blind searching consists of two types Exhaustive search techniques – All the alternatives checked and Partial search techniques – best among the alternatives checked
- Heuristic searching can be Quantitative or Qualitative – stop when the solution is good enough.
    - Modern Heuristic Methods
        - Tabu search - Intelligent search algorithm
        - Genetic algorithms - Survival of the fittest
        - Simulated annealing - Analogy to Thermodynamics
        - Ant colony and other Meta-heuristics
- Simulation
    - Probabilistic/Stochastic & Deterministic Simulation
    - Time-dependent & Time-independent Simulation - Monte Carlo technique
    - Discrete Event & Continuous Simulation
    - Simulation Implementation - Visual - System Dynamics Modeling and/or
                            Object-Oriented Simulation
                            Macro-level simulation models
                            Agent-Based Modeling

Assignment 4
Decision Support Systems (IT445)
Total marks: 5

Q.1 Describe, with examples, the two basic ideas most experts agree that artificial intelligence (AI) is concerned with. (1 mark)

Answer:
- The study of human thought processes (to understand what intelligence is)
- The representation and duplication of those thought processes in machines (e.g., computers, robots)

Q.2 What is knowledge engineering? (1 mark)

Answer: Knowledge engineering is the collection of intensive activities encompassing the acquisition of knowledge from human experts (and other information sources) and conversion of this knowledge into a repository (commonly called a knowledge base).

Q.3 List five disciplines of artificial intelligence. (0.5 mark)

Answer:
- Philosophy
- Human Behavior
- Neurology
- Logic
- Sociology
- Psychology
- Human Cognition
- Linguistics
- Biology
- Pattern Recognition
- Statistics
- Information Systems
- Robotics
- Management Science
- Engineering
- Computer Science
- Mathematics

Q.4 List five applications of artificial intelligence. (0.5 mark)

Answer:
- Expert Systems
- Game Playing
- Computer Vision
- Automatic Programming
- Speech Understanding
- Autonomous Robots
- Intelligent Tutoring
- Intelligent Agents
- Natural Language Processing
- Voice Recognition
- Neural Networks
- Genetic Algorithms
- Fuzzy Logic
- Machine Learning

Q.5 What are important steps in building valuable Knowledge base?   (1 mark)

Answer:

Step 1: Identify the Business Problem

Step 2: Prepare for Change

Step 3: Create the KM Team

Step 4: Perform the Knowledge Audit and Analysis

Step 5: Define the Key Features of the Solution

Step 6: Implement the Building Blocks for Knowledge Management

Step 7: Link Knowledge to People

Q.6 Relate Web 2.0 to knowledge management. (0.5 mark)

Answer:

Web 2.0 is a collective term for interactive applications that allow communication and collaboration online. These applications include mash ups, social networks, media-sharing sites, RSS, blogs, and wikis. They make it easy and natural to share knowledge, there by giving knowledge management a strong boost. In fact, they have made the term knowledge management almost redundant because nontechnical people now can readily share their knowledge. The ultimate value of Web 2.0 in knowledge management is its ability to foster greater responsiveness, better knowledge capture and sharing, and more effective collective intelligence.

Q.7 Give examples of Synchronous and Asynchronous Tools for Indirect Support of Decision Making. (0.5 mark)

Answer:

– Synchronous products
  • Web conferencing
  • Instant messaging (IM)
  • Voice over IP (VoIP)
– Asynchronous products
  • E-mail
  • Wikilogs
  • Online workspaces