**MSDS655 Business Intelligence and Analytics Final Exam**

**Week 1:**

1. **Explain the differences between DSS, BI, and BI Analytics application types.**

A Decision Support System (DSS) helps make informed decisions by analyzing large datasets, often using simulation or optimization tools. Business Intelligence (BI) focuses on gathering, organizing, and reporting data for strategic decisions, typically through dashboards and reports. BI Analytics digs deeper, applying advanced analytics to discover trends and predict future outcomes for better decision-making

1. **Explain the difference between descriptive analytics, predictive analytics and prescriptive analytics and provide one example of each type from the reading material.**

Descriptive analytics tells you what happened. For example, sales reports summarizing last year’s revenue. Predictive analytics forecasts what could happen, like predicting next quarter’s sales using past trends. Prescriptive analytics suggests what you should do next, such as recommending optimal pricing strategies based on forecasted demand.

**Week 2:**

1. **What are the use cases for Big Data/Hadoop and data warehousing/RDBMS?**

Hadoop handles vast amounts of unstructured data, like social media posts or sensor data, efficiently processing them for insights. Data warehousing/RDBMS, on the other hand, excels at structured data, managing financial records or customer transactions for quick retrieval and analysis. Each has its strength depending on the type and scale of the data.

1. **In the era of Big Data, are we about to witness the end of data warehousing? Why?**

No, we’re not. While Big Data tools like Hadoop are amazing for handling unstructured data, data warehousing is still vital for structured data and high-speed querying. Each plays a complementary role—data warehousing provides the reliability and consistency businesses need for structured insights.

**Week 3:**

1. **At a high level, describe the components of a data warehouse. Your response should include discussions of the source system, ETL and BI environments, and the target system.**

A data warehouse pulls raw data from source systems like CRMs or ERPs. The ETL (Extract, Transform, Load) process cleans and structures this data, ensuring it's ready for business intelligence tools to analyze. Finally, the target system stores the processed data, making it accessible for querying and reporting.

1. **Differentiate between operational and decision support data. Distinguish between fact table attributes and dimension table attributes (for example, measures and descriptive fields).**

Operational data is live and constantly changing, supporting day-to-day tasks, while decision support data is historical and used for analysis. Fact table attributes capture numeric measures (like sales amounts), whereas dimension table attributes describe context (like customer names or dates). This distinction drives both operational efficiency and insightful decision-making.

1. **Explain the concept of a star schema. Summarize the advantages of implementing as tar schema in data warehouse design. Provide an example that provides the following: 1 fact table, 3 dimension tables, and attributes in all tables.**

A star schema is a simple, intuitive database design where a central fact table connects to dimension tables, optimizing query speed. It reduces complexity, boosts performance, and makes analysis straightforward. For example, a sales fact table might include "Total Sales," and dimensions could be "Customer" (Name, Region), "Product" (Category, Price), and "Time" (Month, Year).

**Week 4:**

1. **Explain the standardized data mining processes and the steps involved in data pre-processing for data mining.**

In data mining, pre-processing involves cleaning, transforming, and reducing data to make it ready for analysis. This includes handling missing values, normalizing data, and selecting key features to focus on what really matters.

1. **Explain the value that data mining tools provide.**

Data mining tools turn raw data into insights that drive action. They simplify complex tasks like pattern recognition, forecasting, and decision-making. With these tools, businesses can uncover trends, predict outcomes, and gain a competitive edge without needing advanced technical skills.

1. **In your own words, please describe your concerns regarding the Big Data movement in terms of privacy issues (e.g. what is okay and what is not okay).**

Big Data comes with big responsibilities, especially around privacy. It’s okay to use data to improve services, but tracking personal behavior without consent crosses the line. We need transparency and ethical standards to ensure privacy while harnessing the power of data.

**Week 5:**

1. **How can sentiment analysis be used in predicting financial markets?**

Sentiment analysis can unlock patterns in market behavior. By analyzing public sentiment in news articles, social media, or earnings calls, it helps predict trends like stock price fluctuations. For example, positive sentiment around a company often correlates with a rise in stock value, offering investors actionable insights.

1. **Describe the relationships between Web analytics, text mining, and sentiment analysis.**

Web analytics tracks online behavior, while text mining extracts meaningful data from large volumes of text. Sentiment analysis then dives deeper, interpreting emotions or opinions from that text. Together, they provide a powerful toolkit to understand user behavior and predict trends based on online content.

**Week 6:**

1. **List and briefly discuss the three major components of linear programming.**

Linear programming (LP) revolves around three components: decision variables, constraints, and an objective function. Decision variables are what you're trying to control. Constraints are the limits you face, and the objective function is what you’re optimizing, like minimizing costs or maximizing profits.

1. **Explain the concept and roles of decision variables, intermediate result variables, and result variables.**

Decision variables represent the choices you can manipulate, like how many units to produce. Intermediate result variables capture calculations based on those decisions, such as total production cost. Finally, result variables reflect the outcome of your objective function, which shows if you’ve hit your goal.

1. **List and explain the characteristics of LP. Explain how LP can solve allocation problems.**

LP has several key characteristics: linearity, constraints, and non-negativity of decision variables. It can solve allocation problems by determining the best way to distribute limited resources, such as budget or time, across competing activities. This ensures efficiency while meeting all constraints.

1. **Compare and contrast several common optimization models.**

LP focuses on linear relationships, while Integer Programming (IP) restricts variables to whole numbers. Non-linear programming (NLP) allows for curved relationships, offering more complexity but harder solutions. Each model fits different types of problems, so choosing the right one is key.

**Week 7:**

1. **Why are expert systems important for companies to capture knowledge?**

Imagine if your most seasoned employee could “train” a system. Expert systems allow companies to store expert-level knowledge, which can then be used to solve problems even when that employee is unavailable. This ensures knowledge doesn’t walk out the door and helps with consistent decision-making over time.

1. **Explain how Tableau is different from Rapid Miner.**

Tableau is a visualization powerhouse. It excels at turning data into dynamic, shareable dashboards. RapidMiner, on the other hand, focuses on machine learning and data mining, offering tools for predictive analytics that dig deeper into data patterns.

**Week 8:**

1. **Define social network.**

A social network is like a web of connections between individuals or groups. These networks enable the sharing of information, ideas, and support through relationships. Think of it as a digital or physical space where connections come alive.

1. **List the impacts of analytics on decision making**

Analytics provides clarity, speed, and precision in decision-making. It helps businesses make informed choices by highlighting trends, predicting outcomes, and reducing guesswork. With data on their side, companies can respond faster to opportunities and challenges.

1. **Define cloud computing.**

Cloud computing is like having a supercomputer at your fingertips. It allows companies to access storage, software, and processing power over the internet without needing expensive hardware. This flexibility and scalability can lead to cost savings and increased efficiency.

**The following questions are not graded so please be honest:**

* From your perspective, what was useful from this BI course?

The hands-on exercises with real datasets were valuable. They allowed us to apply concepts in a practical way that mirrors real business situations.

* From your perspective, what was useless from this BI course?

I understand the course is designed to include theoretical discussions but I think more time spent on labs and working with visualizations in more depth would be better.