

Application Development Laboratory (CS 33002)

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

School of Computer Engineering



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2 Credit

Analytics Application Development using R

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Diagnostic Analytics



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- ❑ Unlike descriptive analytics, which simply summarizes what happened, diagnostic analytics delves deeper.
- ❑ Diagnostic analytics like putting on the investigative hat and asking: "Why did website traffic plummet? What caused churn in subscription base? Why is this machine malfunctioning?"
- ❑ This analytical examination reveals the hidden factors driving events, empowering to make informed decisions and fix the underlying issues.
- ❑ The primary purpose of diagnostic analytics is to uncover the root causes behind trends, anomalies, or issues identified through data analysis.

Goals



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- 1. Identify root causes:** Diagnostic analytics exactly comes to plight here by finding the exact factors that either lead to the desired effect or the one that needs to be changed.
- 2. Solve problems:** The root cause understanding will allow businesses to take proper actions on target to solve problems and get an opportunity to improve the performance.
- 3. Improve processes:** Inputs from diagnostic analytics can assist in exposing shortcomings or traffic jam in workflow, with the primary aim of process optimization.
- 4. Inform future decisions:** To be well-off with reasons behind things helps to make decisions more based on evidence encountered than assumptions made.

Key Steps in Diagnostic Analytics

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- ❑ **Identify the Anomaly:** The first step is pinpointing the deviation from the norm. Is it a sudden drop in sales, a spike in customer complaints, or an unexpected equipment failure?
- ❑ **Data Collection:** Begin by gathering relevant data from various sources, ensuring a comprehensive dataset. Compile relevant data from various sources – website logs, customer surveys, sensor readings, financial records – to build a comprehensive picture.
- ❑ **Data Exploration:** Dive into the data to uncover hidden insights and anomalies through statistical analysis and visualization.
- ❑ **Pattern Identification:** Employ advanced algorithms to identify patterns and trends in the data. Analyze the data using techniques like drill-down, data mining, and correlation analysis. This involves sifting through layers of information, identifying patterns, and spotting hidden relationships.
- ❑ **Root Cause Analysis:** Drill down into the data to understand the underlying factors contributing to specific outcomes. Based on your analysis, narrow down the possible causes. Was it a competitor's new campaign? A faulty software update? A change in supplier quality?
- ❑ **Testing and Confirmation:** Design and implement tests to validate your hypothesis. Did the website redesign cause the traffic dip? Did the new marketing campaign trigger customer churn?

Importance of Diagnostic Analytics

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- ❑ **Informed Decision-Making:** Diagnostic Analytics equips organizations with the information needed to understand why certain events occurred, facilitating strategic decision-making.
- ❑ **Performance Evaluation:** Businesses can assess the effectiveness of past strategies and operations, enabling continuous improvement.
- ❑ **Root Cause Analysis:** One of the primary goals of diagnostic analytics is to perform root cause analysis. This involves investigating the underlying factors that contribute to a particular outcome, allowing organizations to address fundamental issues rather than just symptoms.
- ❑ **Optimizing Processes:** Diagnostic analytics helps organizations optimize their processes by identifying inefficiencies and bottlenecks. Understanding the factors that impact performance enables businesses to streamline operations, improve resource allocation, and enhance overall efficiency.

Benefit of Diagnostic Analytics



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- ❑ **Deeper Insights:** With detection of reasoning behind "what" to "why," diagnostics analytics provide a profound information about data. It serves to expose the reasons, patterns, and problems behind the trends, deviations, and phenomena, hence, you can make sound decisions based on data which backs a case, not an assumption.
- ❑ **Improved Problem-Solving:** Diagnostics analytics gives you the capacity of pinning down the real reasons behind what you perceive as a problem. Thus, you have a possibility for directed actions aimed at preventing the root of problems, what, in turn, brings about the sensible solutions and sustainable improvements.
- ❑ **Enhanced Decision-Making:** Diagnostic analytics provides you with a predictive mode of causation and exposition from your data. It enables evidence-based decision making so managers will have tactical strategic choices and we will see a performance improvement.

Thank You

End of Lab 8

Lab Experiments



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Download relevant data and perform the following:

1. Human Resources

Goal: Understand employee behavior and sentiment to improve retention and satisfaction.

Examples: Analyze data on employee turnover to identify factors leading to departures, such as low salaries, lack of growth opportunities, or poor work culture.

Benefits: Reduced turnover costs, improved employee morale, and a stronger employer brand.

2. Healthcare

Goal: Enhance patient care and treatment outcomes.

Examples: Analyze patient readmission rates to identify factors contributing to rehospitalization, allowing for improved discharge planning.

Benefits: Improved patient outcomes, reduced healthcare costs, and better resource allocation.

Lab Experiments cont...



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Download relevant data and perform the following:

3. Manufacturing

Goal: Optimize production processes and reduce costs.

Examples: Analyze data on machine downtime to identify causes of equipment failures and implement preventive maintenance strategies.

Benefits: Increased productivity, reduced downtime and waste, and improved product quality.

4. Retail

Goal: Understand customer behavior and optimize marketing campaigns for better sales.

Examples: Analyze customer purchase data to identify trends and target advertising campaigns towards specific demographics or product preferences.

Benefits: Increased sales and customer satisfaction, improved inventory management, and personalized marketing experiences.