Handout: The Data Analytics Process - From Descriptive to Prescriptive

This handout provides a comprehensive overview of the data analytics process, outlining the four key types of analytics: descriptive, diagnostic, predictive, and prescriptive. It explains how each type contributes to a holistic approach to data-driven decision-making, enabling organizations to move from simply interpreting past data to making future-oriented decisions with confidence.

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Overview of the Data Analytics Process

The data analytics process is a series of steps that transforms raw data into actionable insights. Each type of analytics answers a specific question and builds on the previous type, creating a comprehensive approach to data-driven decision-making. Understanding this process allows us to move from simply interpreting past data to making future-oriented decisions with confidence.

The Four Types of Data Analytics

- Descriptive Analytics – _What Happened?_
- Diagnostic Analytics – _Why Did It Happen?_
- Predictive Analytics – _What Could Happen?_
- Prescriptive Analytics – _What Should Be Done?_

Descriptive Analytics	Diagnostic Analytics	Predictive Analytics	Prescriptive Analytics
Purpose: Summarizes past data to identify patterns, trends, and outcomes. It provides an overview of historical performance and helps organizations understand what has already occurred.	Purpose: Dives deeper into data to uncover the reasons behind observed patterns or trends. It allows businesses to understand the causes of specific outcomes.	Purpose: Uses historical data and statistical models to forecast future outcomes. It helps organizations anticipate trends and prepare for upcoming changes.	Purpose: Takes predictions a step further by recommending actions based on data insights. It helps decision-makers determine the best course of action to achieve desired outcomes.
Example: A retail store analyzes its sales data over the past year to identify high-selling products and seasonal trends.	Example: A customer service team examines a spike in customer complaints by analyzing response times, staffing levels, and product issues to identify the root cause.	Example: A hospital predicts patient admission rates for the upcoming months based on historical data, allowing them to allocate resources more effectively.	Example: A restaurant chain uses prescriptive analytics to recommend optimal staffing levels based on predicted customer demand during peak hours.
Tools and Methods: Charts, graphs, and summary statistics (e.g., mean, median) are commonly used to visualize and communicate descriptive analytics.	Tools and Methods: Diagnostic analytics often involves correlation analysis, root cause analysis, and pivot tables to explore relationships within the data.	Tools and Methods: Techniques such as regression analysis, machine learning algorithms, and time-series forecasting are used to make data-driven predictions.	Tools and Methods: Optimization models, decision trees, and scenario analysis are common methods used to provide actionable recommendations.

How the Types of Analytics Work Together

Each type of analytics plays a specific role, and together they form a complete process:

- Descriptive: Provides a foundational understanding by summarizing past data.
- Diagnostic: Adds context by exploring the reasons behind trends or outcomes.
- Predictive: Looks forward, using past data to anticipate future patterns and outcomes.
- Prescriptive: Suggests specific actions based on predictions, helping organizations achieve optimal results.

Example Flow: Imagine a retailer analyzing a decline in quarterly sales:

- Descriptive: Sales dropped by 20% in Q2.
- Diagnostic: The decline was caused by inventory shortages and delayed shipments.
- Predictive: If the trend continues, sales are likely to stay low in Q3.
- Prescriptive: Increase stock levels and optimize supplier contracts to meet anticipated demand.

Real-World Applications of the Data Analytics Process

1 **Netflix**

Descriptive: Identifies the most-watched shows and viewer demographics. Diagnostic: Analyzes why certain genres or shows are popular among specific groups. Predictive: Forecasts future viewer preferences and trends. Prescriptive: Recommends which content to invest in and suggests shows to individual viewers based on their past viewing habits.

2 **Retail Inventory Management**

Descriptive: Summarizes past sales by product and location. Diagnostic: Investigates why sales are lower in certain regions. Predictive: Anticipates demand for the next quarter based on seasonal trends. Prescriptive: Suggests optimal stock levels to prevent shortages or overstocking.

Key Takeaways

The data analytics process provides a structured approach to understanding and utilizing data for decision-making.

Each type of analytics answers a specific question and plays a unique role:

- Descriptive tells us _what happened_.
- Diagnostic explains _why it happened_.
- Predictive looks ahead to _what could happen_.
- Prescriptive recommends _what should be done_.

This process allows organizations across all industries to go from simply observing data to making strategic, data-driven decisions.

By learning and applying these analytics types, you’re equipped to turn raw data into meaningful insights, ultimately guiding better actions and achieving more impactful results.