

Chapter 15

Big Data Predictive and Prescriptive Analytics

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ABSTRACT

The Analytics tools are capable of suggesting the most favourable future planning by analyzing “Why” and “How” blended with What, Who, Where, and When. Descriptive, Predictive, and Prescriptive analytics are the analytics currently in use. Clear understanding of these three analytics will enable an organization to chalk out the most suitable action plan taking various probable outcomes into account. Currently, corporate are flooded with structured, semi-structured, unstructured, and hybrid data. Hence, the existing Business Intelligence (BI) practices are not sufficient to harness potentials of this sea of data. This change in requirements has made the cloud-based “Analytics as a Service (AaaS)” the ultimate choice. In this chapter, the recent trends in Predictive, Prescriptive, Big Data analytics, and some AaaS solutions are discussed.

INTRODUCTION

Business Analytics is a collection of techniques for Collecting, Analyzing and Interpreting data to reveal meaningful information from data. Business analytics focuses on five key areas of

customer requirements (Lustig, Dietrich, Johnson & Dziekan, 2010):

1. Information Access.
2. Insight.
3. Foresight.
4. Business agility.
5. Strategic alignment.

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The phases of Business Analytics are:

1. **Descriptive Analytics:** The first phase of business Analytics. Descriptive analytic is commonly referred to as business intelligence tools. Descriptive analytics takes into consideration what did happen to improved decisions making based on lessons learnt. Descriptive Analytics:
 - a. Prepares and analyzes historical data.
 - b. Identifies patterns from samples for reporting of trends.
2. **Predictive Analytics:** The predictive analytics is mostly used by insurers to evaluate what could happen by analyzing the past to predict the future outcomes. Predictive Analytics is used to:
 - a. Predict future trends and probabilities
 - b. Analyze relationships in data not visible with conventional analysis
3. **Prescriptive analytics:** Prescriptive analytics not only focuses on Why, How, When and What; but also recommends how to act for taking advantage of the circumstance. Prescriptive analytics often serve as a benchmark for an organization's analytics maturity. IBM has defined prescriptive analytics as "the final phase" and the future business analytics (Rijmenam, 2013). Features of prescriptive analytics are:
 - a. Evaluates and determines new ways to operate
 - b. Targets business objectives and balances all constraints

With a clear understanding of Descriptive, Predictive and Prescriptive analytics an organization chalk out the most suitable future planning taking future outcomes into account. This chapter discusses about Predictive Analytics, Prescriptive Analytics, Big Data Analytics, In-database analytics and Analytics as a Service (AaaS).

PREDICTIVE ANALYTICS

Predictive Analytics originated from AI (Artificial Intelligence) for making predictions based on discovered and recognized patterns in dataset. Historically predictive analytics has been studied under the umbrella of Operations Research (OR) or management sciences. Predictive Analytics is also known as "one-click data mining" since Predictive analytics simplifies and automates the data mining process. Predictive analytics develops profiles, discovers the factors that lead to certain outcomes and accordingly predicts the most likely outcomes with degrees of confidence in the predictions.

Predictive Analytics aims at optimizing the performance of a system using sets of intelligent technologies to uncover the relationships and patterns within large volumes of data to predict future events i.e. what is likely to happen (Bertolucci, 2013).

The following are the common predictive analytics modeling tasks (Underwood, 2013):

- **Classification:** Predicting categories of item class mainly using "Decision Tree."
- **Clustering:** Discovering natural groups or Data Clusters.
- **Association:** What occurs together, "Market Basket."
- **Divergence Detection:** Finding changes or deviation.
- **Estimation and Time Series:** Predicting a continuous value.
- **Link Analysis:** Relationship discovery.
- **Web Mining:** Mine relevant information from Structured, Semi-structured and Unstructured data from the web.

Due to fraudulent claims insurance companies losses millions of dollars every year which are ultimately passed down to the customer in terms of higher insurance premiums. Predictive analytics can be used for fraud detection and speeding

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