

Chapter 43

A Systematic Approach for Business Data Analytics With a Real Case Study

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ABSTRACT

Business data analytics is a process of utilizing analytic techniques for resolving business issues based on business performance data. While the avalanche of business data creates unprecedented opportunity, it also poses three fundamental challenges for analytics: (1) Business data often encounters quality issues and needs substantial cleaning efforts; (2) Business data is large in overall size but cannot be fully shared due to the concern of data security; and (3) Business data often needs to be cross-referenced with public databases to reveal more information and knowledge. Due to these challenges, the leading obstacle at many organizations is the lack of a systematic approach to understanding how to leverage the business data analytics techniques to transfer from data-rich into decision-smart. To answer this question, this article proposes a systematic step-by-step procedure for business data analytics. This proposed framework is illustrated and validated by a real case study that involves choosing an optimal location for opening of a new retail site.

INTRODUCTION

Business operations generate huge amounts of valuable data, such as consumer information, transactions data, shipment information, and service record. As the massive data become available, there has been an urgent need to effectively acquire, assess, analyze, and visualize these big data to gain powerful insights and enhance decision makings for business improvement. *Business analytics*, the application of analytic techniques to resolve business issues, has recently become a popular buzzword (Năstase & Stoica, 2010). For example, according to the IBM Tech Trends Report (2011), business analytics has

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been identified as one of the four major technology trends in the 2010s. As there is tremendous value embedded in the business data, the correct use of business analytics will create competitive advantages, such as incremental revenue, decreased cost, fast response in the supply chain, and improved customer experience and engagement.

While the avalanche of business data creates unprecedented opportunity for deeper understandings of the business process, the market environment, the customer behavior, and the competitive strategy, it also poses new challenges in handling the massive volume of data, extracting the useful information, and transferring from data-rich into decision-smart (Abdelhafez, 2014). As predicted by McKinsey Global Institute, by 2018, the United States alone will face a shortage of over 140,000 people with deep analytical skills, as well as a shortfall of 1.5 million managers without knowledge on how to leverage the business of big data to make effective decisions (Manyika et al., 2011).

Generally speaking, there are three fundamental challenges when applying the analytic techniques to the business data: (1) *Business data often encounters quality issues and needs substantial cleaning efforts before making meaningful analysis.* Business data is not error-free and often contains noise in the form of inaccuracies, inconsistencies, and missing data (Tavana, Trevisani, & Kennedy, 2014). These problems occur when the business data is collected from multiple sources, recorded by different people who interpret the data with different terminologies due to diverse training backgrounds, and entered into the database in a variety of formats, coding standards, and aggregation strategies due to the heterogeneity in software used in each department and company. As a result, there is often a lack of a standard approach from loading to cleaning to processing the data before it can be used for decision making. (2) *Business data is large in overall size but cannot be fully shared due to the concern of data security at the company.* Business data is most favorable for decision making when all information of each company can be shared in a common database. However, as there is invaluable confidential information embedded in the business data, prevention of data leakage is often a primary concern at the company. Many companies and markets operate in a highly competitive environment; thus, any privacy failure can potentially lead to a loss of market share, affect customer retention, and cause significant damage to a company's reputation (Schläfke, Silvi, & Möller, 2013). In other words, due to the concern of data security, each company is often only enriched in its own proprietary business data and lacks the detailed transaction data of its competitors. Although the business data has a large size in the overall network, the limited access to the proprietary transaction data at each company essentially hinders the analytics process. (3) *Business data often needs to be cross-referenced with public databases to reveal more information and knowledge.* In addition to the proprietary transaction data owned by the company, there are enormous public databases reported regularly by the government and consortiums. These additional public data sources, covering a variety of information such as economics, population and geography, create another opportunity for the company to cross-reference the data to maximize the advantages of data analytics. However, there are two challenging questions that remain to be solved: (i) where to find and select the relevant public database in the big data environment and (ii) how to bridge the available data (both proprietary and public) under reasonable assumptions to enhance decision making.

These three aforementioned challenging issues often limit the use of business data analytics in practice. As a result, although new technologies have enabled data collection to be easier and faster than ever before, many companies are still looking for a systematic way to obtain the maximum value from their data and compete in the marketplace. The main goal of this article is to outline a systematic step-by-step procedure to transform from data-rich into decision-smart for business data analytics. An overview of the proposed strategy is elaborated in Figure 1 in the Appendix. Detailed explanations and discussions

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