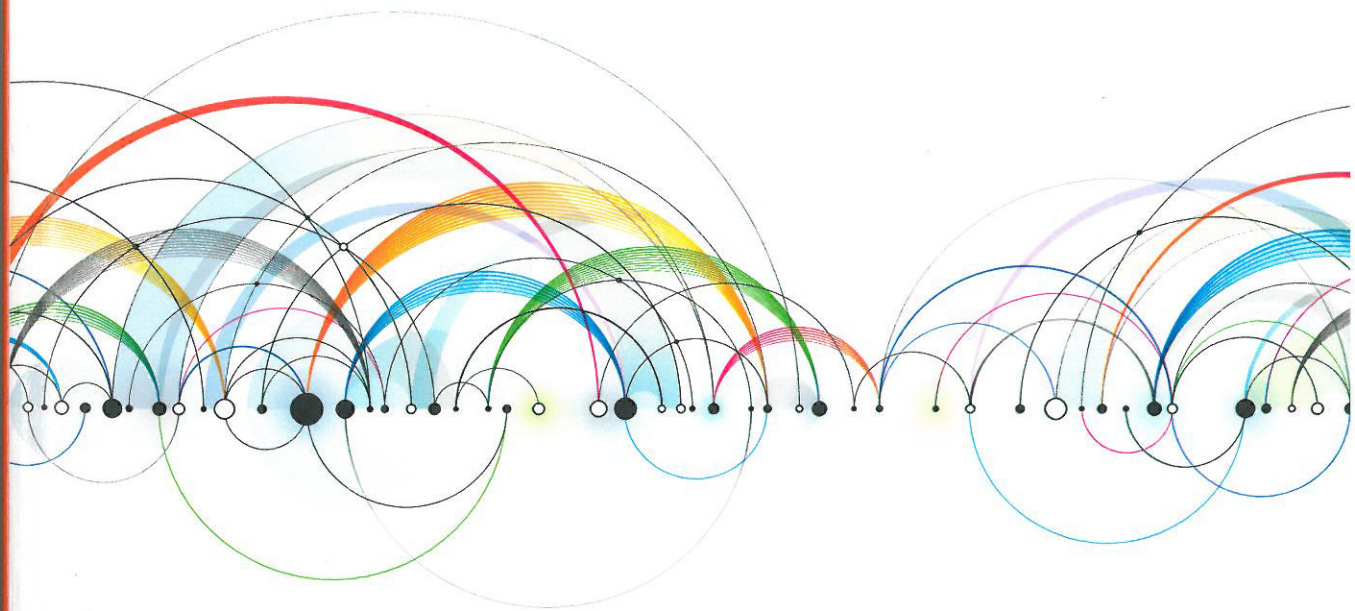


*"A must-read resource for anyone who is serious about embracing the opportunity of big data."*

—Craig Vaughan, Global Vice President, SAP

# Data Science *for* Business

What You Need to Know  
About Data Mining and  
Data-Analytic Thinking



Foster Provost & Tom Fawcett

## Data-Analytic Thinking

Analyzing case studies such as the churn problem improves our ability to approach problems “data-analytically.” Promoting such a perspective is a primary goal of this book. When faced with a business problem, you should be able to assess whether and how data can improve performance. We will discuss a set of fundamental concepts and principles that facilitate careful thinking. We will develop frameworks to structure the analysis so that it can be done systematically.

As mentioned above, it is important to understand data science even if you never intend to do it yourself, because data analysis is now so critical to business strategy. Businesses increasingly are driven by data analytics, so there is great professional advantage in being able to interact competently with and within such businesses. Understanding the fundamental concepts, and having frameworks for organizing data-analytic thinking not only will allow one to interact competently, but will help to envision opportunities for improving data-driven decision-making, or to see data-oriented competitive threats.

Firms in many traditional industries are exploiting new and existing data resources for competitive advantage. They employ data science teams to bring advanced technologies to bear to increase revenue and to decrease costs. In addition, many new companies are being developed with data mining as a key strategic component. Facebook and Twitter, along with many other “Digital 100” companies (*Business Insider*, 2012), have high valuations due primarily to data assets they are committed to capturing or creating.<sup>4</sup> Increasingly, managers need to oversee analytics teams and analysis projects, marketers have to organize and understand data-driven campaigns, venture capitalists must be

4. Of course, this is not a new phenomenon. Amazon and Google are well-established companies that get tremendous value from their data assets.

able to invest wisely in businesses with substantial data assets, and business strategists must be able to devise plans that exploit data.

As a few examples, if a consultant presents a proposal to mine a data asset to improve your business, you should be able to assess whether the proposal makes sense. If a competitor announces a new data partnership, you should recognize when it may put you at a strategic disadvantage. Or, let's say you take a position with a venture firm and your first project is to assess the potential for investing in an advertising company. The founders present a convincing argument that they will realize significant value from a unique body of data they will collect, and on that basis are arguing for a substantially higher valuation. Is this reasonable? With an understanding of the fundamentals of data science you should be able to devise a few probing questions to determine whether their valuation arguments are plausible.

On a scale less grand, but probably more common, data analytics projects reach into all business units. Employees throughout these units must interact with the data science team. If these employees do not have a fundamental grounding in the principles of data-analytic thinking, they will not really understand what is happening in the business. This lack of understanding is much more damaging in data science projects than in other technical projects, because the data science is supporting improved decision-making. As we will describe in the next chapter, this requires a close interaction between the data scientists and the business people responsible for the decision-making. Firms where the business people do not understand what the data scientists are doing are at a substantial disadvantage, because they waste time and effort or, worse, because they ultimately make wrong decisions.



#### **The need for managers with data-analytic skills**

The consulting firm McKinsey and Company estimates that “there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.” (Manyika, 2011). Why 10 times as many managers and analysts than those with deep analytical skills? Surely data scientists aren't so difficult to manage that they need 10 managers! The reason is that a business can get leverage from a data science team for making better decisions in multiple areas of the business. However, as McKinsey is pointing out, the managers in those areas need to understand the fundamentals of data science to effectively get that leverage.