

# Preface

Knowledge management involves application of human knowledge (epistemology) with the technological advances of our current society (computer systems) and big data, both in terms of collecting data and in analyzing it. We see three types of analytic tools. **Descriptive** analytics focus on reports of what has happened. **Predictive** analytics extend statistical and/or artificial intelligence to provide forecasting capability. It also includes classification modeling. **Diagnostic** analytics can apply analysis to sensor input to direct control systems automatically. **Prescriptive** analytics applies quantitative models to optimize systems, or at least to identify improved systems. Data mining includes descriptive and predictive modeling. Operations research includes all four. This book focuses on the forecasting component of predictive modeling, with the classification portion of prescriptive analytics demonstrated.

## Book Concept

The book seeks to provide simple explanations and demonstration of some predictive tools. Chapter 3 covers simple moving average, because it is a component of ARIMA models covered later, and linear regression. This is extended in Chap. 4 to causal regression. Chapter 5 covers regression trees. Chapter 6 describes and demonstrates autoregressive integrated moving-average (ARIMA) and generalized autoregressive conditional heteroscedasticity (GARCH) models. Chapter 7 provides a quick overview of classification modeling. Chapter 8 reviews how these different kinds of predictive models provide value in the era of big data.

Models are demonstrated using business related data to include stock indices, crude oil price, and the price of gold. The style of the book is intended to be descriptive, seeking to explain how methods work, with some citations, but without deep scholarly reference. The data sets and software are all selected for widespread availability and access by any reader with computer links.

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