

# Contents

|          |  |    |
|----------|--|----|
| <b>1</b> | <b>Introduction</b>  | 1  |
| 1.1      | Analytics and Business   | 1  |
| 1.2      | Goal of This Book  | 3  |
| 1.3      | Who Should Read This Book?                                       | 4  |
| 1.4      | What This Book Is <i>Not</i>                                     | 5  |
| 1.4.1    | This Is Not a Statistics Book                                    | 5  |
| 1.4.2    | This Is Not a Data Mining Book                                   | 5  |
| 1.5      | What This Book <i>Is</i>   | 5  |
| 1.6      | Structure of This Book   | 6  |
| 1.7      | Using This Book in a Course                                      | 7  |
| <b>2</b> | <b>Exploring and Discovering Data</b>                            | 9  |
| 2.1      | Basic Data Summaries and Visualizations: House Price Data        | 10 |
| 2.2      | Data Transformations and Trellis Graphs: Direct Marketing Data   | 20 |
| 2.3      | Time Series Graphs: Soft Drink Sales Data                        | 25 |
| 2.4      | Spatial Graphs: Online Purchase Preferences Data                 | 28 |
| 2.5      | Graphs for Categorical Responses: Consumer-to-Consumer Loan Data | 30 |
| 2.6      | Graphs for Panel Data: Customer Loyalty Data                     | 34 |
| <b>3</b> | <b>Data Modeling I – Basics</b>                                  | 41 |
| 3.1      | Introduction: Why Do We Need Models?                             | 42 |
| 3.2      | Fitting and Interpreting a Regression Model:                     |    |
|          | Least Squares Regression   | 47 |
| 3.2.1    | The Idea of Least Squares Regression                             | 48 |
| 3.2.2    | Interpreting a First Simple Regression Model                     | 50 |
| 3.2.3    | Evaluating a Regression Model                                    | 52 |
| 3.2.4    | Comparing Regression Models                                      | 55 |

|          |   |     |
|----------|---|-----|
| 3.3      | Identifying and Selecting Important Predictors: Statistical Inference   | 57  |
| 3.3.1    | The Signal-to-Noise Ratio .....   | 57  |
| 3.3.2    | Testing for Statistical Significance .....  | 59  |
| 3.3.3    | Gauging Practical Importance .....  | 59  |
| 3.4      | Data Case: Understanding Customers' Spending Patterns<br>Using Basic Regression .....                                     | 61  |
| <b>4</b> | <b>Data Modeling II – Making Models More Flexible</b> .....   | 67  |
| 4.1      | More Flexible Models (1): Dummy Variables<br>and Interaction Terms .....  | 68  |
| 4.1.1    | Dummy Variables .....   | 71  |
| 4.1.2    | Interaction Terms .....   | 77  |
| 4.2      | More Flexible Models (2): Nonlinear Relationships<br>and Data Transformations .....                                       | 81  |
| 4.2.1    | Data Transformations .....  | 85  |
| 4.2.2    | Interpreting Nonlinear Regression Models .....  | 88  |
| 4.3      | Data Case: Using Interaction Terms and Data<br>Transformations to Better Understand Customers'<br>Spending Patterns ..... | 91  |
| <b>5</b> | <b>Data Modeling III – Making Models More Selective</b> .....   | 101 |
| 5.1      | Models with Too Many Predictors: Multicollinearity<br>and Variable Selection .....  | 101 |
| 5.1.1    | Multicollinearity .....   | 105 |
| 5.1.2    | Curing Multicollinearity and Variable Selection .....   | 107 |
| 5.2      | Data Case: Using Variable Selection of Financial<br>Indicators to Predict a Company's Stock Price .....                   | 111 |
| <b>6</b> | <b>Data Modeling IV-Fine-Tuning Your Model</b> .....  | 125 |
| 6.1      | Assessing the Quality of a Model: Predictive Power<br>vs. Model Fit .....   | 126 |
| 6.1.1    | The Shortcomings of Model Fit Statistics .....  | 126 |
| 6.1.2    | Measuring the Predictive Power of a Model .....   | 132 |
| 6.2      | Exploring and Modeling Complex Relationships:<br>Nonparametric Regression and Regression Trees .....                      | 142 |
| 6.2.1    | Uncovering Interactions with Regression Trees .....   | 143 |
| 6.2.2    | Modeling Nonlinear Relationships Using<br>Nonparametric Regression .....  | 152 |
| 6.3      | Data Case: Fine-Tuning Stock Price Prediction Models .....  | 161 |
| <b>7</b> | <b>Appendix: Introduction to the Statistical Software R</b> .....   | 167 |
| 7.1      | How and Where Do I Get R? .....   | 168 |
| 7.2      | How Do I Get Started with R? .....  | 168 |
| 7.3      | Basic R Manipulations .....   | 170 |
| 7.4      | Loading Data, Executing Functions, and Exporting Results .....  | 171 |
| 7.5      | R Libraries .....   | 176 |

|              |                                 |     |
|--------------|---------------------------------|-----|
| 7.6          | Graphical User Interfaces ..... | 179 |
| 7.6.1        | Rcmdr .....                     | 179 |
| 7.6.2        | Rattle .....                    | 181 |
| <b>Index</b> | .....                           | 185 |

<http://www.springer.com/978-1-4614-0405-7>

Business Analytics for Managers

Jank, W.

2011, XI, 189 p. 100 illus., 63 illus. in color., Softcover

ISBN: 978-1-4614-0405-7