Detailed Contents

Table of Cases xv
Table of Legislation xvii
List of Contributors xxi

1. Algorithmic Regulation: An Introduction 1
Karen Yeung and Martin Lodge
1. Introduction 1
2. What is Algorithmic Regulation? 4
3. Anything New under the Sun? 6
4. Understanding Algorithmic Regulation as a Complex Socio-Technical System 8
5. The Organization and Content of this Volume 14

PART I: NORMATIVE CONCERNS

2. Why Worry about Decision-Making by Machine? 21
Karen Yeung
1. Introduction 21
2. Worries about Automated Decision-Making Systems 23
2.1 Process-Based Concerns 24
2.1.1 No Human Actor Capable of Taking Responsibility for Decision 24
2.1.2 Lack of Participation, Due Process, or Opportunities for Contestation 25
2.1.3 Unlawful or Unfairly Discriminatory Input Variables and/or Algorithms 26
2.1.4 Transparency, Explainability, and Reason-Giving 28
2.1.5 Dehumanized Decision-Making 29
2.2 Outcome-Based Concerns 31
2.2.1 Erroneous and Inaccurate Decisions 31
2.2.2 Biased/Discriminatory Outputs Generating Injustice/Unfairness 32
2.2.3 Imitating Human Traits and Affective Responses 33
3. Data-Driven Prediction and Personalized Information Services 34
3.1 Predictive Personalization and Data-Driven 'Hypernudging' 34
3.2 Population-Wide Dataveillance and Algorithmic Regulation 35
4. How Should We Respond to these Concerns: Towards a Vocabulary of Justice, Rights, Wrongs, Harms? 37
4.1 Justice, Democracy and Freedom in a Data-Driven Machine Age 38

4.2 From 'Data Ethics' to Institutional Safeguards: Rights, Risks, Harms, and Wrongs 39
5. Conclusion 43

3. Machine Decisions and Human Consequences 49
Teresa Scantamburlo, Andrew Charlesworth, and Nello Cristianini
1. Introduction 49
2. Machine Decisions: The Technology 53
2.1 Machine Learning 53
2.2 Performance of Classifiers 53
2.3 Learning to Classify 55
2.4 Correlation vs Causation 56
2.5 On Bias 57
3. Machine Decisions in Criminal Justice 58
3.1 Risk Assessment Tools 58
3.2 The Harm Assessment Risk Tool (HART) 59
3.3 The Classification Method 59
3.4 The Training and the Test Sets 61
3.5 The Features and the Labels 61
3.6 Validation and Performance Measure 62
3.7 Operationalizing Trust: Four Normative Benchmarks for Machine Decision-Making 66
3.8 Prediction Accuracy 67
3.9 Fairness and Equality 69
3.10 Transparency and Accountability 71
3.11 Informational Privacy and Freedom of Expression 73
4. Concluding Remarks 75

4. Digital Discrimination 82
Natalia Criado and Jose M Such
1. Introduction 82
1.1 Discrimination 82
1.2 Digital Discrimination 84
2. Examples of Digital Discrimination 87
3. Research on Addressing Digital Discrimination 89
3.1 Detecting Discrimination 89
3.2 Avoiding Discrimination 90
3.2.1 Problem Model 90
3.2.2 Data Preprocessing 90
3.2.3 Algorithm Modification 91
4. Unresolved Issues Surrounding Digital Discrimination 92
4.1 Socio-Economic and Cultural Dimensions of Digital Discrimination 93
4.2 Legal-Ethical Digital Discrimination Frameworks 93
4.3 Formal Non-Discrimination Computational Norms 94
4.4 Automated Certification of Non-Discrimination Norms 94
5. Conclusion 95

5. The Ethics of Algorithmic Outsourcing in Everyday Life 98
John Danaher
1. Introduction: Algorithmic Tools and Everyday Life 98
2. Understanding Algorithmic Tools 99
3. Do Algorithmic Tools Undermine Autonomy? 102
4. But is it any Different this Time Round? 109
5. How Should We Respond? 112
6. Conclusion 115

PART II: PUBLIC SECTOR APPLICATIONS

6. Administration by Algorithm? Public Management Meets Public Sector Machine Learning 121
Michael Veale and Irina Brass
1. Introduction 121
2. Automation Systems 123
3. Augmentation Systems 125
4. Scholarly Interest in Socio-Algorithmic Issues 127
5. Emerging Management of Public Sector Machine Learning 128
   5.1 Macro: Government Strategy and Best Practices 128
      5.1.1 New Coordination Mechanisms 128
      5.1.2 New Cross-Cutting Rights and Obligations 130
      5.1.3 New Capacities 131
   5.2 Meso: From High Level Policy to Practice 132
      5.2.1 Balancing Quality Assurance and Accountability 133
      5.2.2 Monitoring Algorithmic Systems Performance 136
   5.3 Micro: Frontline Service Delivery 138
      5.3.1 Automated Processing and the Rights of the Data Subject 139
      5.3.2 Algorithmic Decisions, Legitimacy, and Frontline Discretion 140
6. Concluding Remarks 142

7. The Practical Challenges of Implementing Algorithmic Regulation for Public Services 150
Alex Griffiths
1. Introduction 150
2. The Role of Data in Regulation 152
3. Determining Risk 153
   3.1 Rules-Based Approaches 154
   3.2 Data-Informed Approaches 155
   3.3 Algorithmic Approaches 157
4. Case Study I: 'Intelligent Monitoring' and the Care Quality Commission 159
   4.1 How Did 'Intelligent Monitoring' Perform? 160
   4.2 Why Did 'Intelligent Monitoring' Perform Poorly? 161
5. Case Study II: Prioritizing Quality Assurance Agency Reviews 162
   5.1 How Effective was the Algorithmic Approach? 164
   5.2 Why Did the Algorithmic Approach Fail? 166

6. The Conditions Necessary for Algorithmic Regulation to Succeed 170
7. Conclusion 171

8. Reflecting on Public Service Regulation by Algorithm 178
Martin Lodge and Andrea Mennicken
1. Introduction 178
2. Regulatory Capacity and Algorithmic Regulation 181
3. Regulating Public Services *by* Algorithm 185
3.1 Knowledge Creation 186
3.2 Coordination and Integration 190
3.3 Ambiguity over Objectives 193
4. Who Regulates the Algorithms? 194
5. Implications 196

PART III: GOVERNING ALGORITHMIC SYSTEMS

9. Algorithms, Regulation, and Governance Readiness 203
Leighton Andrews
1. Introduction 203
2. Governance Readiness 205
3. Algorithmic Harms and their Governance Challenges 210
4. Assessing Governance Readiness 213
5. Conclusion 217

10. Legal Practitioners' Approach to Regulating AI Risks 224
Jason D Lohr, Winston J Maxwell, and Peter Watts
1. Introduction 224
2. Machine Learning and the Law 225
2.1 Machine Learning is a Subset of AI 225
2.2 Lack of Explainability 226
2.3 New Types of Rogue Errors 227
2.4 Human Automation Bias 228
2.5 New Challenges for Corporate Responsibilities and Governance 228
2.6 New Market Distortions 229
2.7 Diffuse Social Harms 230
3. The Role of Data in AI 231
3.1 Input Data May Be Subject to Restrictions 231
3.2 Input Data Will Influence Outcomes 231
3.3 Input Data May Make the Algorithm More Valuable 232
3.4 Identity Data May Be Reverse Engineered 233
4. Using Contracts to Manage AI Risk 234
4.1 Protecting the Value of a Trained AI Model 234
4.2 Contractual Use Restrictions to Avoid Revealing Trade Secrets 235
4.3 Allocating Liability if Things Go Wrong 235

5. Contractual Provisions to Ensure Compliance with Regulatory Requirements 237
5.1 Avoiding Issues Related to Profiling or Bias 237
5.2 Sector-Specific Compliance Responsibilities 238
5.3 Geographic Restrictions Linked to Export Controls and Data Localization Requirements 238
5.4 Data Security 238
5.5 Respecting Data Privacy Obligations 239
6. Corporate Governance Requires Human Decision-Making 240
7. Models for Regulation 240
7.1 Do We Need Specific AI Regulation at All? 240
7.2 AI Risks Should Be Regulated Using a Sector Approach 242
7.3 A Regulatory Role Observing and Measuring Diffuse AI Harms 243
7.4 High-Level Guiding Principles 244
7.5 Who Will Take the Initiative? 245
8. Conclusion 245

11. Minding the Machine v2.0: The EU General Data Protection Regulation and Automated Decision-Making 248
Lee A Bygrave
1. Introduction 248
2. Minding the Machine v1.0 249
3. Article 22 GDPR 251
4. Moulding the Machine v1.0 255
5. Taming the Machine? 258

Index 263