Contents

Preface ix

Part I: Intelligence Reimagined 1

1 The Rise of Machine Learning 3
2 The Rebirth of Artificial Intelligence 27
3 The Dawn of Neural Networks 37
4 Brain-style Computing 49
5 Insights from the Visual System 63

Part II: Many Ways to Learn 79

6 The Cocktail Party Problem 81
7 The Hopfield Net and Boltzmann Machine 91
8 Backpropagating Errors 109
9 Convolutional Learning 127
10 Reward Learning 143
11 Neural Information Processing Systems 161

Part III: Technological and Scientific Impact 169

12 The Future of Machine Learning 171
13 The Age of Algorithms 195
14 Hello, Mr. Chips 205
15 Inside Information 219
16 Consciousness 233
17 Nature Is Cleverer Than We Are 245
18 Deep Intelligence 261
Contents

Acknowledgments  269
Recommended Reading   275
Glossary       281
Notes          285
Index          321