Table of Contents

Pretace	1
Chapter 1: Getting Started	6
Introduction	6
Installing R with an IDE	7
Getting ready	7
How to do it	8
Installing a Jupyter Notebook application	9
How to do it	10
There's more	11
Starting with the basics of machine learning in R	12
How to do it	13
How it works	17
Setting up deep learning tools/packages in R	18
How to do it	18
Installing MXNet in R	19
Getting ready	19
How to do it	20
Installing TensorFlow in R	21
Getting ready	21
How to do it	21
How it works	22
See also	23
Installing H2O in R	24
Getting ready	24
How to do it	24
How it works	26
There's more	29
Installing all three packages at once using Docker	30
Getting ready	30
How to do it	31
There's more	32
Chapter 2: Deep Learning with R	33
Starting with logistic regression	33
Getting ready	34

How to do it	34
Introducing the dataset	35
Getting ready	35
How to do it	36
Performing logistic regression using H2O	37
Getting ready	37
How to do it	38
How it works	40
See also	41
Performing logistic regression using TensorFlow	42
Getting ready	42
How to do it	42
How it works	44
Visualizing TensorFlow graphs	45
Getting ready	45
How to do it	46
How it works	49
Starting with multilayer perceptrons	50
Getting ready	50
How to do it	51
There's more	52
See also	53
Setting up a neural network using H2O	53
Getting ready	53
How to do it	54
How it works	56
Tuning hyper-parameters using grid searches in H2O	57
Getting ready	57
How to do it	57
How it works	58
Setting up a neural network using MXNet	59
Getting ready	59
How to do it	59
How it works	61
Setting up a neural network using TensorFlow	61
Getting ready	61
How to do it	62
How it works	65
There's more	66

Chapter 3: Convolution Neural Network	68
Introduction	69
Downloading and configuring an image dataset	70
Getting ready	70
How to do it	70
How it works	73
See also	74
Learning the architecture of a CNN classifier	74
Getting ready	74
How to do it	75
How it works	76
Using functions to initialize weights and biases	77
Getting ready	78
How to do it	78
How it works	78
Using functions to create a new convolution layer	78
Getting ready	79
How to do it	79
How it works	81
Using functions to create a new convolution layer	82
Getting ready	82
How to do it	82
How it works	83
Using functions to flatten the densely connected layer	83
Getting ready	83
How to do it	84
How it works	84
Defining placeholder variables	85
Getting ready	85
How to do it	85
How it works	86
Creating the first convolution layer	86
Getting ready	86
How to do it	87
How it works	87
Creating the second convolution layer	88
Getting ready	88
How to do it	88
How it works	89

Flattening the second convolution layer	90
Getting ready	90
How to do it	91
How it works	91
Creating the first fully connected layer	91
Getting ready	91
How to do it	92
How it works	92
Applying dropout to the first fully connected layer	92
Getting ready	92
How to do it	92
How it works	93
Creating the second fully connected layer with dropout	93
Getting ready	93
How to do it	94
How it works	94
Applying softmax activation to obtain a predicted class	94
Getting ready	94
How to do it	95
Defining the cost function used for optimization	95
Getting ready How to do it	95
	95
How it works	96
Performing gradient descent cost optimization Getting ready	96
How to do it	96 96
Executing the graph in a TensorFlow session	96
Getting ready	97
How to do it	97
How it works	98
Evaluating the performance on test data	99
Getting ready	99
How to do it	99
How it works	101
Chapter 4: Data Representation Using Autoencoders	
Introduction	104
Setting up autoencoders	104
Getting ready	106
How to do it	107 107
TIOW to do it	107
[iv]	
L - * J	

Data normalization	108
Getting ready	108
Visualizing dataset distribution	109
How to do it	110
How to set up an autoencoder model	111
Running optimization	114
Setting up a regularized autoencoder	115
Getting ready	115
How to do it	116
How it works	116
Fine-tuning the parameters of the autoencoder	117
Setting up stacked autoencoders	118
Getting ready	119
How to do it	120
Setting up denoising autoencoders	121
Getting ready	121
How to do it	121
Reading the dataset	121
Corrupting data to train	122
Setting up a denoising autoencoder	124
How it works	126
Building and comparing stochastic encoders and decoders	127
Getting ready	128
How to do it	129
Setting up a VAE model	130
Output from the VAE autoencoder	134
Learning manifolds from autoencoders	135
How to do it	135
Setting up principal component analysis	136
Evaluating the sparse decomposition	139
Getting ready	140
How to do it	140
How it works	141
Chapter 5: Generative Models in Deep Learning	
<u> </u>	143
Comparing principal component analysis with the Restricted	
Boltzmann machine	144
Getting ready	145
How to do it	145
Setting up a Restricted Boltzmann machine for Bernoulli distribution	
input	149

Getting ready	150
How to do it	150
Training a Restricted Boltzmann machine	151
Getting ready	151
Example of a sampling	151
How to do it	152
Backward or reconstruction phase of RBM	152
Getting ready	153
How to do it	153
Understanding the contrastive divergence of the reconstruction	154
Getting ready	154
How to do it	154
How it works	155
Initializing and starting a new TensorFlow session	155
Getting ready	156
How to do it	156
How it works	157
Evaluating the output from an RBM	158
Getting ready	159
How to do it	159
How it works	160
Setting up a Restricted Boltzmann machine for Collaborative Filtering	162
Getting ready	162
How to do it	162
Performing a full run of training an RBM	164
Getting ready	167
How to do it	167
Setting up a Deep Belief Network	169
Getting ready	171
How to do it	171
How it works	174
Implementing a feed-forward backpropagation Neural Network	175
Getting ready	176
How to do it	176
How it works	180
Setting up a Deep Restricted Boltzmann Machine	180
Getting ready	181
How to do it	181
How it works	186

Chapter 6: Recurrent Neural Networks	188
Setting up a basic Recurrent Neural Network	188
Getting ready	189
How to do it	189
How it works	192
Setting up a bidirectional RNN model	193
Getting ready	193
How to do it	194
Setting up a deep RNN model	197
How to do it	197
Setting up a Long short-term memory based sequence model	198
How to do it	198
How it works	199
Chapter 7: Reinforcement Learning	202
Introduction	202
Setting up a Markov Decision Process	204
Getting ready	204
How to do it	205
Performing model-based learning	210
How to do it	212
Performing model-free learning	213
Getting ready	213
How to do it	215
Chapter 8: Application of Deep Learning in Text Mining	218
Performing preprocessing of textual data and extraction of sentiments	218
How to do it	219
How it works	225
Analyzing documents using tf-idf	226
How to do it	226
How it works	228
Performing sentiment prediction using LSTM network	229
How to do it	229
How it works	233
Application using text2vec examples	233
How to do it	233
How it works	236
Chapter 9: Application of Deep Learning to Signal processing	237

Introducing and preprocessing music MIDI files	237
Getting ready	238
How to do it	239
Building an RBM model	239
Getting ready	239
How to do it	240
Generating new music notes	242
How to do it	242
Chapter 10: Transfer Learning	243
Introduction	243
Illustrating the use of a pretrained model	245
Getting ready	246
How to do it	246
Setting up the Transfer Learning model	249
Getting ready	249
How to do it	249
Building an image classification model	252
Getting ready	252
How to do it	252
Training a deep learning model on a GPU	256
Getting ready	256
How to do it	256
Comparing performance using CPU and GPU	257
Getting ready	258
How to do it	258
There's more	260
See also	260
Index	261