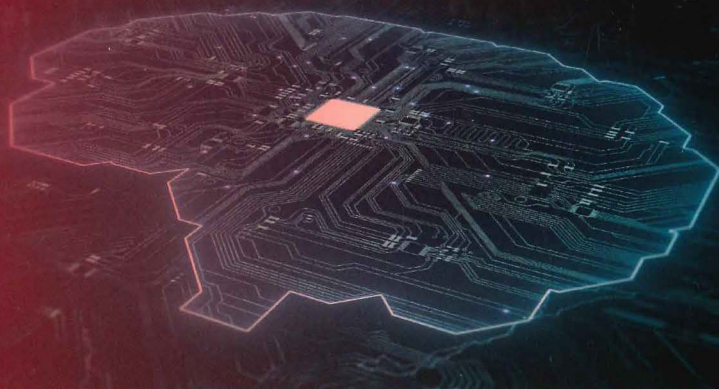


Texts in Computer Science

Wei Qi Yan



# Computational Methods for Deep Learning

Theoretic, Practice and  
Applications

 Springer

pb5  
8,825

Wei Qi Yan

616580096  
012534389  
122558099

# Computational Methods for Deep Learning

Theoretic, Practice and Applications



---

# Contents

<b>1</b>	<b>Introduction</b>	1
1.1	Introduction	1
1.2	Deep Learning	3
1.3	The Chronicle of Deep Learning	6
1.4	Our Deep Learning Projects	12
1.5	Awarded Work in Deep Learning	14
1.6	Questions	15
	References	15
<b>2</b>	<b>Deep Learning Platforms</b>	21
2.1	Introduction	21
2.2	MATLAB for Deep Learning	22
2.3	TensorFlow for Deep Learning	26
2.4	Data Augmentation	31
2.5	Fundamental Mathematics	32
2.6	Questions	36
	References	37
<b>3</b>	<b>CNN and RNN</b>	39
3.1	CNN and YOLO	39
3.1.1	R-CNN	40
3.1.2	Mask R-CNN	41
3.1.3	YOLO	42
3.1.4	SSD	43
3.1.5	DenseNets and ResNets	43
3.2	RNN and Time Series Analysis	44
3.3	HMM	45
3.3.1	RNN: Recurrent Neural Networks	46
3.3.2	Time Series Analysis	50
3.4	Functional Spaces	53
3.4.1	Metric Space	53

3.5	Vector Space . . . . .	54
3.5.1	Normed Space . . . . .	57
3.5.2	Hilbert Space . . . . .	58
3.6	Questions . . . . .	60
	References . . . . .	60
<b>4</b>	<b>Autoencoder and GAN . . . . .</b>	<b>65</b>
4.1	Autoencoder . . . . .	65
4.2	Regularizations and Autoencoders . . . . .	66
4.3	Generative Adversarial Networks . . . . .	68
4.4	Information Theory . . . . .	71
4.5	Questions . . . . .	75
	References . . . . .	76
<b>5</b>	<b>Reinforcement Learning . . . . .</b>	<b>77</b>
5.1	Introduction . . . . .	77
5.2	Bellman Equation . . . . .	78
5.3	Deep $Q$ -Learning . . . . .	80
5.4	Optimization . . . . .	83
5.5	Data Fitting . . . . .	83
5.6	Questions . . . . .	86
	References . . . . .	87
<b>6</b>	<b>CapsNet and Manifold Learning . . . . .</b>	<b>89</b>
6.1	CapsNet . . . . .	89
6.2	Manifold Learning . . . . .	92
6.3	Questions . . . . .	95
	References . . . . .	97
<b>7</b>	<b>Boltzmann Machines . . . . .</b>	<b>99</b>
7.1	Boltzmann Machine . . . . .	99
7.2	Restricted Boltzmann Machine . . . . .	99
7.3	Deep Boltzmann Machine . . . . .	102
7.4	Probabilistic Graphical Models . . . . .	102
7.5	Questions . . . . .	107
	References . . . . .	107
<b>8</b>	<b>Transfer Learning and Ensemble Learning . . . . .</b>	<b>109</b>
8.1	Transfer Learning . . . . .	109
8.1.1	Transfer Learning . . . . .	109
8.1.2	Taskonomy . . . . .	110
8.2	Siamese Neural Networks . . . . .	111
8.3	Ensemble Learning . . . . .	112
8.4	Important Work in Deep Learning . . . . .	115

---

8.5	Awarded Work in Deep Learning . . . . .	118
8.6	Questions . . . . .	118
	References . . . . .	118
<b>Glossary</b>	. . . . .	121
<b>Index</b>	. . . . .	127