

Table of Contents

Introduction	1
Speeding Learning	
Preface	7
1 Efficient BackProp <i>Yann LeCun, Leon Bottou, Genevieve B. Orr, and Klaus-Robert Müller</i>	9
Regularization Techniques to Improve Generalization	
Preface	51
2 Early Stopping – But When? <i>Lutz Prechelt</i>	55
3 A Simple Trick for Estimating the Weight Decay Parameter <i>Thorsteinn S. Rögnvaldsson</i>	71
4 Controlling the Hyperparameter Search in MacKay’s Bayesian Neural Network Framework <i>Tony Plate</i>	93
5 Adaptive Regularization in Neural Network Modeling <i>Jan Larsen, Claus Svarer, Lars Nonboe Andersen, and Lars Kai Han- sen</i>	113
6 Large Ensemble Averaging <i>David Horn, Ury Naftaly, and Nathan Intrator</i>	133
Improving Network Models and Algorithmic Tricks	
Preface	141
7 Square Unit Augmented, Radially Extended, Multilayer Perceptrons <i>Gary William Flake</i>	145
8 A Dozen Tricks with Multitask Learning <i>Rich Caruana</i>	165
9 Solving the Ill-Conditioning in Neural Network Learning <i>Patrick van der Smagt and Gerd Hirzinger</i>	193
10 Centering Neural Network Gradient Factors <i>Nicol N. Schraudolph</i>	207

11 Avoiding Roundoff Error in Backpropagating Derivatives 227
Tony Plate

Representing and Incorporating Prior Knowledge in Neural Network Training

Preface 235

12 Transformation Invariance in Pattern Recognition – Tangent Distance and Tangent Propagation 239
Patrice Y. Simard, Yann A. LeCun, John S. Denker, and Bernard Victorri

13 Combining Neural Networks and Context-Driven Search for On-Line, Printed Handwriting Recognition in the Newton 275
Larry S. Yaeger, Brandyn J. Webb, and Richard F. Lyon

14 Neural Network Classification and Prior Class Probabilities 299
Steve Lawrence, Ian Burns, Andrew Back, Ah Chung Tsoi, and C. Lee Giles

15 Applying Divide and Conquer to Large Scale Pattern Recognition Tasks 315
Jürgen Fritsch and Michael Finke

Tricks for Time Series

Preface 343

16 Forecasting the Economy with Neural Nets: A Survey of Challenges and Solutions 347
John Moody

17 How to Train Neural Networks 373
Ralph Neuneier and Hans Georg Zimmermann

Author Index 425

Subject Index 427