

CONTENTS

Series Foreword	vii
Foreword	viii
Contributors	xi
Acknowledgments	xiv
1 Introduction	1
Manfred Opper and David Saad	
2 From Naive Mean Field Theory to the TAP Equations	7
Manfred Opper and Ole Winther	
3 An Idiosyncratic Journey Beyond Mean Field Theory	21
Jonathan S. Yedidia	
4 Mean Field Theory for Graphical Models	37
Hilbert J. Kappen and Wim J. Wiegierinck	
5 The TAP Approach to Intensive and Extensive Connectivity Systems	51
Yoshiyuki Kabashima and David Saad	
6 TAP For Parity Check Error Correcting Codes	67
David Saad, Yoshiyuki Kabashima and Renato Vicente	
7 Adaptive TAP Equations	85
Manfred Opper and Ole Winther	
8 Mean-field Theory of Learning: From Dynamics to Statics	99
K. Y. Michael Wong, S. Li and Peixun Luo	
9 Saddle-point Methods for Intractable Graphical Models	119
Fernando J. Pineda, Cheryl Resch and I-Jeng Wang	
10 Tutorial on Variational Approximation Methods	129
Tommi S. Jaakkola	
11 Graphical Models and Variational Methods	161
Zoubin Ghahramani and Matthew J. Beal	
12 Some Examples of Recursive Variational Approximations for Bayesian Inference	179
K. Humphreys and D.M. Titterington	
13 Tractable Approximate Belief Propagation	197
David Barber	

14	The Attenuated Max-Product Algorithm	213
	Brendan J. Frey and Ralf Koetter	
15	Comparing the Mean Field Method and Belief Propagation for Approximate Inference in MRFs	229
	Yair Weiss	
16	Information Geometry of α-Projection in Mean Field Approximation	241
	Shun-ichi Amari, Shiro Ikeda and Hidetoshi Shimokawa	
17	Information Geometry of Mean-Field Approximation	259
	Toshiyuki Tanaka	