

# Contents

PREFACE . . . . .	v
INTRODUCTION . . . . .	vii
1. INDUCTIVE PAC-BAYESIAN LEARNING . . . . .	1
1.1. BASIC INEQUALITY . . . . .	2
1.2. NON LOCAL BOUNDS . . . . .	5
1.2.1. <i>Unbiased empirical bounds</i> . . . . .	5
1.2.2. <i>Optimizing explicitly the exponential parameter <math>\lambda</math></i> . . . . .	8
1.2.3. <i>Non random bounds</i> . . . . .	9
1.2.4. <i>Deviation bounds</i> . . . . .	11
1.3. LOCAL BOUNDS . . . . .	14
1.3.1. <i>Choice of the prior</i> . . . . .	14
1.3.2. <i>Unbiased local empirical bounds</i> . . . . .	15
1.3.3. <i>Non random local bounds</i> . . . . .	17
1.3.4. <i>Local deviation bounds</i> . . . . .	18
1.3.5. <i>Partially local bounds</i> . . . . .	22
1.3.6. <i>Two step localization</i> . . . . .	27
1.4. RELATIVE BOUNDS . . . . .	33
1.4.1. <i>Basic inequalities</i> . . . . .	34
1.4.2. <i>Non random bounds</i> . . . . .	37
1.4.3. <i>Unbiased empirical bounds</i> . . . . .	40
1.4.4. <i>Relative empirical deviation bounds</i> . . . . .	44
2. COMPARING POSTERIOR DISTRIBUTIONS TO GIBBS PRIORS . . . . .	51
2.1. BOUNDS RELATIVE TO A GIBBS DISTRIBUTION . . . . .	51
2.1.1. <i>Comparing a posterior distribution with a Gibbs prior</i> . . . . .	52
2.1.2. <i>The effective temperature of a posterior distribution</i> . . . . .	55
2.1.3. <i>Analysis of an empirical bound for the effective temperature</i> . . . . .	56
2.1.4. <i>Adaptation to parametric and margin assumptions</i> . . . . .	61
2.1.5. <i>Estimating the divergence of a posterior with respect to a Gibbs prior</i> . . . . .	67
2.2. PLAYING WITH TWO POSTERIOR AND TWO LOCAL PRIOR DISTRIBUTIONS	68
2.2.1. <i>Comparing two posterior distributions</i> . . . . .	68
2.2.2. <i>Elaborate uses of relative bounds between posteriors</i> . . . . .	70
2.2.3. <i>Analysis of relative bounds</i> . . . . .	75