

Contents

Glossary of notation	viii
1 Introduction	1
1.1 One-dimensional records	2
1.2 Multidimensional record	4
1.3 Review of the literature on multidimensional records	4
1.4 Outline of the thesis	5
2 General theory of chain-maxima and chain-records	8
2.1 Preliminaries	8
2.2 The Markov property	10
2.3 Asymptotic results	12
2.3.1 On the total number of records	12
2.3.2 Limiting results for maxima and records	13
2.3.3 A martingale and laws of large numbers	15
2.4 On the point process of chain record values	18
2.4.1 Independent continuous components	19
2.5 Cone induced order and strict dominance	22
2.5.1 Cone records	22
2.5.2 Strict records	22
2.5.3 Discrete observations with independent components	25
3 The uniform model on the hypercube	28
3.1 Records	28
3.2 Record heights	30
3.2.1 Asymptotic analysis of $\mu_n^{(k)}$	32
3.2.2 Weak convergence of record heights	41
3.3 Mixed moments of \mathcal{M}_n	42
3.3.1 Asymptotic analysis of $\mu_n^{k,l}$	43
3.4 On the counting process of records	49
3.4.1 Convergence in L_2	50
4 The uniform model on the d-simplex	58
4.1 Records	58
4.1.1 Convergence of \mathcal{R}_n	61
4.1.2 Perpetuity representation of \mathcal{R}_∞	62
4.2 Record heights	67

4.2.1	Asymptotic analysis of $\lambda_n^{(k)}$	69
4.2.2	Weak convergence of record heights	82
4.3	Study of \mathcal{N}_n	82
4.3.1	Preliminaries and previous results	82
4.3.2	Law of large numbers for \mathcal{N}_n	85
4.3.3	Asymptotic normality for \mathcal{N}_n	86
5	Work in progress	87
5.1	Convergence of \mathcal{M}_n	87
5.2	Solving the recurrence for \mathbf{f}_n	89
5.3	Delannoy numbers	90
5.4	Stick- and board-breaking models	92
5.4.1	Stick-breaking	92
5.4.2	Board-breaking	93
Final comments		96
Bibliography		100