

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Outline . . . . .	3
1.2	Bibliographic Notes . . . . .	4
<b>2</b>	<b>Smoothed Analysis</b>	<b>5</b>
2.1	Smoothed Analysis of Algorithms . . . . .	5
2.1.1	Smoothed Analysis of the Simplex Algorithm . . . . .	7
2.1.2	Smoothed Analysis of Condition Numbers . . . . .	8
2.1.3	Discrete Perturbation Models . . . . .	9
2.2	Smoothed Analysis of Geometric Structures . . . . .	10
2.2.1	Probability Distributions . . . . .	11
<b>3</b>	<b>Left-to-Right Maxima</b>	<b>13</b>
3.1	Average Case Analysis . . . . .	15
3.2	Upper Bounds for the Smoothed Case . . . . .	16
3.2.1	Gaussian Normal Noise . . . . .	21
3.2.2	Uniform Noise . . . . .	22
3.2.3	Unimodal Noise Distributions . . . . .	23
3.3	Lower Bounds for the Smoothed Case . . . . .	25
3.4	Conclusion . . . . .	27
<b>4</b>	<b>Extreme Points</b>	<b>29</b>
4.1	Average Case Analysis . . . . .	33
4.2	Upper Bounds for the Smoothed Case . . . . .	37
4.2.1	Normal Gaussian Noise . . . . .	41
4.2.2	Uniform Noise . . . . .	43
4.3	Lower Bounds for the Smoothed Case . . . . .	44
4.4	Conclusion . . . . .	54
<b>5</b>	<b>Bounding Box of a Moving Point Set</b>	<b>57</b>
5.1	Analysing Motion . . . . .	58
5.1.1	Kinetic Data Structures . . . . .	58
5.1.2	Motion Complexity . . . . .	58
5.1.3	Smoothed Motion Complexity . . . . .	59

5.2	Motion Complexity of the Bounding Box . . . . .	59
5.2.1	Duality between Bounding Box and Convex Hull . . . . .	60
5.2.2	Average Motion Complexity of the Bounding Box . . . . .	62
5.2.3	Upper Bounds on the Smoothed Motion Complexity . . . . .	62
5.2.4	Lower Bounds on the Smoothed Motion Complexity . . . . .	63
5.2.5	Improved Upper Bounds on the Smoothed Motion Complexity . .	63
5.3	Conclusion . . . . .	64
<b>6</b>	<b>Voronoi Diagram and Delaunay Triangulation</b>	<b>67</b>
6.1	Average Case Analysis . . . . .	69
6.2	Proof of Lemma 8 . . . . .	73
<b>7</b>	<b>Summary and Open Problems</b>	<b>89</b>
	<b>Bibliography</b>	<b>91</b>