

Table of Contents

Preface to the Second Printing	v
Preface	vii
Notation	xiii
1. Introduction	1
1.1 Discrepancy for Rectangles and Uniform Distribution	1
1.2 Geometric Discrepancy in a More General Setting	9
1.3 Combinatorial Discrepancy	16
1.4 On Applications and Connections	22
2. Low-Discrepancy Sets for Axis-Parallel Boxes	37
2.1 Sets with Good Worst-Case Discrepancy	38
2.2 Sets with Good Average Discrepancy	44
2.3 More Constructions: b -ary Nets	51
2.4 Scrambled Nets and Their Average Discrepancy	61
2.5 More Constructions: Lattice Sets	72
3. Upper Bounds in the Lebesgue-Measure Setting	83
3.1 Circular Discs: a Probabilistic Construction	84
3.2 A Surprise for the L_1 -Discrepancy for Halfplanes	93
4. Combinatorial Discrepancy	101
4.1 Basic Upper Bounds for General Set Systems	101
4.2 Matrices, Lower Bounds, and Eigenvalues	105
4.3 Linear Discrepancy and More Lower Bounds	109
4.4 On Set Systems with Very Small Discrepancy	117
4.5 The Partial Coloring Method	120
4.6 The Entropy Method	128
5. VC-Dimension and Discrepancy	137
5.1 Discrepancy and Shatter Functions	137
5.2 Set Systems of Bounded VC-Dimension	145
5.3 Packing Lemma	155

5.4	Matchings with Low Crossing Number	159
5.5	Primal Shatter Function and Partial Colorings	164
6.	Lower Bounds	171
6.1	Axis-Parallel Rectangles: L_2 -Discrepancy	172
6.2	Axis-Parallel Rectangles: the Tight Bound	176
6.3	A Reduction: Squares from Rectangles	180
6.4	Halfplanes: Combinatorial Discrepancy	182
6.5	Combinatorial Discrepancy for Halfplanes Revisited.....	193
6.6	Halfplanes: the Lebesgue-Measure Discrepancy	197
6.7	A Glimpse of Positive Definite Functions	203
7.	More Lower Bounds and the Fourier Transform	213
7.1	Arbitrarily Rotated Squares	213
7.2	Axis-Parallel Cubes	230
7.3	An Excursion to Euclidean Ramsey Theory	234
A.	Tables of Selected Discrepancy Bounds	241
B.	News Scan 1999–2009	245
	Bibliography	251
	Index	273
	Hints	283

Geometric Discrepancy

An Illustrated Guide

Matousek, J. (Ed.)

1999, XI, 289 p., Softcover

ISBN: 978-3-642-03941-6