

Contents

| | | |
|----------|---|------------|
| 1 | Introduction | 1 |
| | References | 9 |
| 2 | Fundamentals of Spatial Statistics | 11 |
| 2.1 | Estimation of Spatial Trend | 13 |
| 2.2 | Universal Kriging | 14 |
| 2.3 | Local Regression | 17 |
| 2.4 | Variogram Fitting | 23 |
| 2.5 | Example | 28 |
| 2.6 | Exercises | 34 |
| | References | 37 |
| 3 | Fundamentals of Experimental Design | 43 |
| 3.1 | Information Matrices | 45 |
| 3.2 | Design Criteria | 50 |
| 3.3 | Numerical Algorithms | 57 |
| 3.4 | Further Design Topics Useful in the Spatial Setting . . . | 60 |
| 3.5 | Example | 64 |
| 3.6 | Exercises | 68 |
| | References | 70 |
| 4 | Exploratory Designs | 77 |
| 4.1 | Deterministic and Random Sampling | 79 |
| 4.2 | Space Filling Designs | 82 |
| 4.3 | Designs for Local Regression | 85 |
| 4.4 | Model Discriminating Designs | 88 |
| 4.5 | Example | 90 |
| 4.6 | Exercises | 94 |
| | References | 96 |
| 5 | Designs for Spatial Trend Estimation | 101 |
| 5.1 | Approximate Information Matrices | 102 |
| 5.2 | Replication-Free Designs | 105 |

| | | |
|----------|--|------------|
| 5.3 | Designs for Correlated Fields | 110 |
| 5.4 | Designs for Spatial Prediction | 125 |
| 5.5 | Example | 128 |
| 5.6 | Exercises | 133 |
| | References | 135 |
| 6 | Design and Dependence | 141 |
| 6.1 | Designs for Detecting Spatial Dependence | 142 |
| 6.2 | Designs for Variogram Estimation | 151 |
| 6.3 | Methods Based on Likelihood Approaches | 161 |
| 6.4 | Example | 162 |
| 6.5 | Exercises | 167 |
| | References | 169 |
| 7 | Multipurpose Designs | 173 |
| 7.1 | Combining Different Purpose Designs | 175 |
| 7.2 | Likelihood-based Approaches | 177 |
| 7.3 | Alternative ‘Direct’ Approaches | 180 |
| 7.4 | Example | 182 |
| 7.5 | Exercises | 186 |
| | References | 188 |
| | Appendix | 193 |
| A.1 | Data Sets | 193 |
| A.2 | Proofs for Chapter 2 | 195 |
| A.3 | Proofs for Chapter 3 | 196 |
| A.4 | Proofs for Chapter 4 | 198 |
| A.5 | Proofs for Chapter 5 | 201 |
| A.6 | Proofs for Chapter 6 | 216 |
| A.7 | Proofs for Chapter 7 | 217 |
| A.8 | D2PT Description | 218 |
| | References | 225 |
| | List of Figures | 227 |
| | Author Index | 229 |
| | Subject Index | 237 |

Collecting Spatial Data

Optimum Design of Experiments for Random Fields

Müller, W.G.

2007, XII, 242 p. 37 illus., Hardcover

ISBN: 978-3-540-31174-4