

CONTENTS

| | |
|--|-----|
| Preface | V |
| Contents | VII |
| Chapter 1. Introduction | 1 |
| 1.1 Objectives | 1 |
| 1.2 Formal Methods | 2 |
| 1.3 Steps Prior to Data Collection | 3 |
| 1.4 Statement of the Problem | 3 |
| 1.5 The Mathematical Model | 4 |
| 1.6 Variables | 6 |
| 1.7 Sampling Considerations | 21 |
| A. Which method? | 21 |
| B. Sampling unit | 24 |
| C. Logistic considerations | 25 |
| Chapter 2. Resemblance functions | 42 |
| 2.1 General aspects | 42 |
| 2.2 Resemblance structure | 42 |
| 2.3 Sample space | 43 |
| 2.4 Metrics and metric-related functions | 44 |
| A. Constraints on metrics | 44 |
| B. The Euclidean distance, variants of formulae, and related cross product forms | 45 |
| C. Absolute value function | 55 |
| D. Geodesic metric | 57 |
| 2.5 Semimetrics and scrambled forms of metrics | 57 |
| 2.6 Useful non-metric functions | 62 |
| A. A probabilistic similarity index | 62 |
| B. Calhoun distance | 64 |
| C. Mountford's index | 66 |
| D. Measures of information divergence | 68 |
| 2.7 Inequalities and partitions | 83 |
| A. Information | 83 |
| B. Sum of squares | 93 |
| 2.8 Transformations implicit in resemblance functions | 93 |
| 2.9 Further remarks on resemblance functions | 97 |
| Chapter 3. Ordination | 102 |
| 3.1 Ordination objectives | 102 |
| 3.2 Data structure | 104 |

| | | |
|----------------------------------|--|-----|
| 3.3 | Ordinations as transfer systems | 109 |
| 3.4 | Summarization and multidimensional scaling – Linear case | 109 |
| 3.5 | Summarization and multidimensional scaling – Non-linear case | 137 |
| 3.6 | Predictive ordinations | 146 |
| | A. Trend seeking | 146 |
| | B. Reciprocal ordering | 152 |
| | C. Factor analysis | 168 |
| 3.7 | Display and evaluation of ordination results | 170 |
| 3.8 | Sources of distortion | 181 |
| Chapter 4. Classification | | 186 |
| 4.1 | Informal approaches | 186 |
| 4.2 | Formal clustering methods | 186 |
| 4.3 | The medium | 188 |
| 4.4 | Why classify? | 189 |
| 4.5 | Classification or ordination | 191 |
| 4.6 | Model for classification | 192 |
| 4.7 | On concepts and terminology | 194 |
| 4.8 | Classification of clustering methods | 198 |
| 4.9 | Selected techniques | 199 |
| | A. Q-clustering methods | 199 |
| | B. R-clustering methods | 224 |
| | C. Gradient and other ordination-based methods | 233 |
| | D. Predictive methods | 237 |
| | E. Methods for large samples | 238 |
| 4.10 | Evaluation of clustering results | 239 |
| | A. Recognition of types | 239 |
| | B. Representation of types | 240 |
| | C. Comparison of types | 241 |
| | D. Predictive use of classifications | 251 |
| | E. Classification as a means for scaling | 256 |
| | F. Further on deterministic comparisons | 260 |
| | G. Comparison of dendrograms | 264 |
| | H. Comparison of dendrogram structure and input data | 275 |
| | I. Reallocation | 277 |
| 4.11 | Factors influencing choice | 277 |
| 4.12 | Classification: success or failure? | 281 |
| Chapter 5. Identification | | 284 |
| 5.1 | Generalized distance | 284 |
| 5.2 | Discriminant function | 291 |
| 5.3 | Rank order | 298 |
| 5.4 | Information | 300 |
| 5.5 | Bayesian analysis | 301 |
| 5.6 | Matching properties | 307 |
| 5.7 | Dichotomous keys | 307 |
| 5.8 | Further remarks on identification | 307 |

| | |
|--|------------|
| Chapter 6. Multivariate analysis – a discussion | 309 |
| 6.1 Choice of method | 309 |
| 6.2 Observations regarding data and method | 316 |
| 6.3 Prognosis | 318 |
| 6.4 Bibliographic notes | 320 |
| References | 321 |
| Appendix | 348 |
| Glossary | 436 |
| Author index | 442 |
| Subject index | 449 |