APPLIED NONPARAMETRIC STATISTICAL METHODS

Third edition

P. Sprent and N.C. Smeeton

Texts in Statistical Science

Contents

Prefa	Preface		xi	
1	Introducing nonparametric methods			1
1.1	Basic statistics			1
1.2	Samples and populations			9
1.3	Hypothesis tests			11
1.4	Estimation			24
1.5	Ethical issues			27
1.6	Computers and nonparametric methods			30
1.7	Further reading			31
	Exercises			32
2	Centrality inference for single samples			34
2.1	Using measurement data			34
2.2 2.3	Inferences about medians based on ranks		i	43
2.3				57
2.4	Transformation of ranks			60
2.5	Asymptotic results			64
2.6		*		69
2.7	· · · · · · · · · · · · · · · · · · ·			71
2.8	Summary			74
	Exercises			75
3	Other single-sample inference			78
3.1	Inferences for dichotomous data			78
3.2	Tests related to the sign test			89
3.3	Matching samples to distributions			92
3.4	Angular data			106
3.5	A runs test for randomness		*	111
3.6	Fields of application			114
3.7	Summary	•		116
	Exercises			117
4	Methods for paired samples			120
4.1	Comparisons in pairs			120
4.2	A less obvious use of the sign test			129
4.3	Power and sample size			130
4.4	Fields of application			139
4.5	Summary			142
	Exercises			142

viii Contents

5	Methods for two independent samples	146
5.1	Centrality tests and estimates	146
5.2	Rank based tests	147
5.3	The median test	· 155
5.4	Normal scores	161
5.5	Tests for survival data	163
5.6	Asymptotic approximations	167
5.7	Power and sample size	170
5.8	Tests for equality of variance	175
5.9	Tests for a common distribution	185
	Fields of application	189
5.11	Summary	191
	Exercises	192
6	Three or more samples	197
6.1	Comparisons with parametric methods	197
6.2	Centrality tests for independent samples	198
6.3	Centrality tests for related samples	210
6.4	More detailed treatment comparisons	219
6.5	Tests for heterogeneity of variance	228
6.6	Some miscellaneous considerations	229
6.7	Fields of application	230
6.8	Summary	232
	Exercises	233
7	Correlation and concordance	238
7.1	Correlation and bivariate data	238
7.2	Ranked data for several variables	261
7.3	Agreement	264
7.4	Fields of application	268
7.5	Summary	270
	Exercises	271
8	Regression	274
8.1	Bivariate linear regression	274
8.2	Multiple regression	299
8.3	Nonparametric regression models	300
8.4	Other multivariate data problems	305
8.5	Fields of application	306
8.6	Summary	306
•	Exercises	307
9	Categorical data	310
9.1	Categories and counts	310
9.2	Nominal attribute categories	321

		Contents	ix
9.3	Ordered categorical data		328
9.4	Goodness-of-fit tests for discrete data		339
9.5	Extension of McNemar's test	•	343
9.6	Fields of application		345
9.7	Summary		348
	Exercises		349
10	Association in categorical data		354
10.1	The analysis of association		354
10.2	Some models for contingency tables		356
10.3	Combining and partitioning of tables		389
10.4	Power		397
10.5	Fields of application		397
10.6	Summary		399
	Exercises	·	400
11	Robust estimation		404
	When assumptions break down		404
11.2	Outliers and influence		406
	The bootstrap		412
	M-estimators and other robust estimators		429
	Fields of application		435
11.6	Summary		436
	Exercises		437
Apper	ndix .		438
Refere	References		439
Soluti	ons to odd-numbered exercises		453
Index			457