



Book: Advanced Statistical Methods and Applications

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Abstract

Advanced Statistical Methods and Applications' Book in 10 chapters, three attachments and 574 pages has been published. The aim of the author is that in addition to learning theory and statistical methods, how to use SPSS and Minitab software for Statistical analysis also consider and take action. The author has tried to use the software to be learned step by step.

The main topics of the book are: Data Description, Graphs & Tables, Descriptive Statistics, Probability and its Application, Normal Distribution, Sampling and Sample Size Estimation with Statistical Software, Statistical Hypothesis, Parametric & Non-parametric Tests, Statistics Inference, Statistical Results, Correlation, Linear & Nonlinear Regression, Logistic Regression, Factor Analysis, Missing Values, Durbin-Watson Test, Influential Data, Reliability, Odds Ratio, Outliers, Homogeneity of Variance, Goodness of Fit Test, Fisher Exact Test, Time Series Analysis.

Of the most important tools used in the Advanced Statistical Methods and Applications' Book is data files that the author of several years of research collected and managed them. The book has 80 data files, each one in its own right and statistical issues related to the expression is used. At the end of each chapter, a variety of exercises with answers and solutions are provided using statistical software. A summary of each chapter, describes data files, dictionary of statistics, statistical distributions tables, resources and articles including book content.





Book List

Chapter 1: *Express Concluding Observations: Grouping, Charts and Tables*

- *Introduction: Know your data*
- *Sensing observations and scaling*
- *Grouping Concluding Observations*
- *Express Concluding Observations by the Charts*
- *Draw a diagram using the weighted observations*
- *Express Concluding Observations by statistical tables*
- *Exercises Chapter 1*

Chapter 2: *Express Concluding Observations: Numerical descriptions*

- *Introduction: Measurement*
- *Central measurements and metrics focus*
- *Measures of dispersion and distribution*
- *Working with the software, find the central tendency and dispersion measures*
- *Transforms smoothly from observations*
- *Coefficient of variation*
- *Exercises Chapter 2*

Chapter 3: *Probability and its Application*

- *Overview of the History of Science Probability*
- *Sample space and events*
- *Applying a series on events*
- *De Morgan's laws and some of the relationships among a set*
- *Axioms of probability*
- *Basic theorems of probability*
- *Conditional Probability*
- *Bayes formula*
- *Independent events*
- *Proof of Hardy-Weinberg law in genetics*





Chapter 4: *Normal distribution and its properties*

- *Introduction: Overview of the History of the normal distribution*
- *Mathematical equation of the normal distribution*
- *Calculate the area under the normal curve*
- *Normality test observations*
- *Exercises Chapter 4*

Chapter 5: *Sampling and its Variety of methods*

- *Introduction: basic concepts*
- *The main stages of work sampling study*
- *Observations and data collecting methods*
- *Questionnaire design*
- *Samples selection*
- *Validity and reliability*
- *Random sampling*
- *Ratios and percentages*
- *sample size estimation*
- *Inverse Sampling*
- *Stratified random sampling*
- *Systematic sampling*
- *Exercises Chapter 5*

Chapter 6: *Statistical inference and conclusion*

- *Introduction: statistical estimation of a parameter*
- *A variety of statistical estimation: point and interval estimation*
- *Point estimation of the mean and proportion*
- *Mean distance estimation*
- *proportion distance estimation*
- *Chi-square, T student and Fisher distributions*
- *Distance estimate for the variance of a population*
- *Distance estimate for the variance in the normal population*
- *Distance estimation mean parameters difference between normal population*





- *Interval estimation of proportion parameters differences in the two populations*
- *Exercises Chapter 6*

Chapter 7: Statistical hypothesis tests

- *Introduction: definition of basic concepts*
- *Assumptions and statistical errors*
- *the probability Value (P-value)*
- *Mean and proportion test in a population*
- *Sample t-test*
- *Ratio tests*
- *two tests in a population variance*
- *Equality of variance test in a population*
- *Equality test of variance in the two populations*
- *Analysis of variance and the ratio of the two populations*
- *Test statistical comparison between the independent populations*
- *The difference of two independent sample test*
- *The statistical comparison of paired samples test*
- *ANOVA*
- *Exercises Chapter 7*

Chapter 8: Correlation and regression analysis

- *Introduction: The relationship between the quantities*
- *Correlation coefficients*
- *Types of correlation coefficients*
- *Pearson correlation coefficient*
- *Spearman correlation coefficients*
- *Kendall's correlation coefficient*
- *Measurement Agreement*
- *Regression analysis*
- *Using charts to show the suitability of a regression model*
- *Normal probability plots of the residuals*
- *Chart call the quantity remaining in the fitted values*
- *Remaining in the graph of observation*





- *Using linear regression data*
- *Linear Regression Models*
- *Durbin-Watson test*
- *Find the influential or effective data*
- *Exercises Chapter 8*

Chapter 9: *Non-linear regression model (logistic regression)*

- *Introduction: the theory of non-linear regression models*
- *Non-linear logistic regression model*
- *Using logistic regression model data*

Chapter 10: *Non-parametric statistical tests*

- *Introduction: The concept of non-parametric*
- *Fitness or goodness of fit test*
- *Chi-square test for goodness of fit*
- *Chi-square test for independence*
- *Non-parametric Mann-Whitney test*
- *Non-parametric Wilcoxon signed rank test*
- *Kruskal - Wallis test*
- *Friedman non-parametric test*
- *Exercises Chapter 10*

Attachment 1: *Factor analysis*

Attachment 2: *Outliers and missing values*

Attachment 3: *Sample Size Estimation with Statistical Software*

