

1. Record Nr.	UNINA9910554816803321
Autore	Denis Daniel J. <1974->
Titolo	Applied univariate, bivariate, and multivariate statistics using Python // Daniel J. Denis
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons, , [2021] ©2021
ISBN	1-5231-4320-7 1-119-57818-3 1-119-57820-5 1-119-57817-5
Descrizione fisica	1 online resource (300 pages)
Disciplina	519.5302855133
Soggetti	Statistics Multivariate analysis Python (Computer program language) Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- 1. A Brief Introduction and Overview of Applied Statistics -- 1.1 How Statistical Inference Works -- 1.2 Statistics and Decision-Making -- 1.3 Quantifying Error Rates in Decision-Making: Type I and Type II Errors -- 1.4 Estimation of Parameters -- 1.5 Essential Philosophical Principles for Applied Statistics -- 1.6 Continuous vs. Discrete Variables -- 1.6.1 Continuity Is Not Always Clear-Cut -- 1.7 Using Abstract Systems to Describe Physical Phenomena: Understanding Numerical vs. Physical Differences -- 1.8 Data Analysis, Data Science, Machine Learning, Big Data -- 1.9 "Training" and "Testing" Models: What "Statistical Learning" Means in the Age of Machine Learning and Data Science -- 1.10 Where We Are Going From Here: How to Use This Book -- Review Exercises -- 2. Introduction to Python and the Field of Computational Statistics -- 2.1 The Importance of Specializing in Statistics and Research, Not Python: Advice for Prioritizing Your Hierarchy -- 2.2 How to Obtain Python -- 2.3 Python Packages -- 2.4

Installing a New Package in Python -- 2.5 Computing z-Scores in Python -- 2.6 Building a Dataframe in Python: And Computing Some Statistical Functions -- 2.7 Importing a .txt or .csv File -- 2.8 Loading Data into Python -- 2.9 Creating Random Data in Python -- 2.10 Exploring Mathematics in Python -- 2.11 Linear and Matrix Algebra in Python: Mechanics of Statistical Analyses -- 2.11.1 Operations on Matrices -- 2.11.2 Eigenvalues and Eigenvectors -- Review Exercises -- 3. Visualization in Python: Introduction to Graphs and Plots -- 3.1 Aim for Simplicity and Clarity in Tables and Graphs: Complexity is for Fools! -- 3.2 State Population Change Data -- 3.3 What Do the Numbers Tell Us? Clues to Substantive Theory -- 3.4 The Scatterplot -- 3.5 Correlograms -- 3.6 Histograms and Bar Graphs.

3.7 Plotting Side-by-Side Histograms -- 3.8 Bubble Plots -- 3.9 Pie Plots -- 3.10 Heatmaps -- 3.11 Line Charts -- 3.12 Closing Thoughts -- Review Exercises -- 4. Simple Statistical Techniques for Univariate and Bivariate Analyses -- 4.1 Pearson Product-Moment Correlation -- 4.2 A Pearson Correlation Does Not (Necessarily) Imply Zero Relationship -- 4.3 Spearman's Rho -- 4.4 More General Comments on Correlation: Don't Let a Correlation Impress You Too Much! -- 4.5 Computing Correlation in Python -- 4.6 T-Tests for Comparing Means -- 4.7 Paired-Samples t-Test in Python -- 4.8 Binomial Test -- 4.9 The Chi-Squared Distribution and Goodness-of-Fit Test -- 4.10 Contingency Tables -- Review Exercises -- 5. Power, Effect Size, P-Values, and Estimating Required Sample Size Using Python -- 5.1 What Determines the Size of a P-Value? -- 5.2 How P-Values Are a Function of Sample Size -- 5.3 What is Effect Size? -- 5.4 Understanding Population Variability in the Context of Experimental Design -- 5.5 Where Does Power Fit into All of This? -- 5.6 Can You Have Too Much Power? Can a Sample Be Too Large? -- 5.7 Demonstrating Power Principles in Python: Estimating Power or Sample Size -- 5.8 Demonstrating the Influence of Effect Size -- 5.9 The Influence of Significance Levels on Statistical Power -- 5.10 What About Power and Hypothesis Testing in the Age of "Big Data"? -- 5.11 Concluding Comments on Power, Effect Size, and Significance Testing -- Review Exercises -- 6. Analysis of Variance -- 6.1 T-Tests for Means as a "Special Case" of ANOVA -- 6.2 Why Not Do Several t-Tests? -- 6.3 Understanding ANOVA Through an Example -- 6.4 Evaluating Assumptions in ANOVA -- 6.5 ANOVA in Python -- 6.6 Effect Size for Teacher -- 6.7 Post-Hoc Tests Following the ANOVA F-Test -- 6.8 A Myriad of Post-Hoc Tests -- 6.9 Factorial ANOVA -- 6.10 Statistical Interactions.

6.11 Interactions in the Sample Are a Virtual Guarantee: Interactions in the Population Are Not -- 6.12 Modeling the Interaction Term -- 6.13 Plotting Residuals -- 6.14 Randomized Block Designs and Repeated Measures -- 6.15 Nonparametric Alternatives -- 6.15.1 Revisiting What "Satisfying Assumptions" Means: A Brief Discussion and Suggestion of How to Approach the Decision Regarding Nonparametrics -- 6.15.2 Your Experience in the Area Counts -- 6.15.3 What If Assumptions Are Truly Violated? -- 6.15.4 Mann-Whitney U Test -- 6.15.5 Kruskal-Wallis Test as a Nonparametric Alternative to ANOVA -- Review Exercises -- 7. Simple and Multiple Linear Regression -- 7.1 Why Use Regression? -- 7.2 The Least-Squares Principle -- 7.3 Regression as a "New" Least-Squares Line -- 7.4 The Population Least-Squares Regression Line -- 7.5 How to Estimate Parameters in Regression -- 7.6 How to Assess Goodness of Fit? -- 7.7 R2 - Coefficient of Determination -- 7.8 Adjusted R2 -- 7.9 Regression in Python -- 7.10 Multiple Linear Regression -- 7.11 Defining the Multiple Regression Model -- 7.12 Model Specification Error -- 7.13 Multiple Regression in

Python -- 7.14 Model-Building Strategies: Forward, Backward, Stepwise -- 7.15 Computer-Intensive "Algorithmic" Approaches -- 7.16 Which Approach Should You Adopt? -- 7.17 Concluding Remarks and Further Directions: Polynomial Regression -- Review Exercises -- 8. Logistic Regression and the Generalized Linear Model -- 8.1 How Are Variables Best Measured? Are There Ideal Scales on Which a Construct Should Be Targeted? -- 8.2 The Generalized Linear Model -- 8.3 Logistic Regression for Binary Responses: A Special Subclass of the Generalized Linear Model -- 8.4 Logistic Regression in Python -- 8.5 Multiple Logistic Regression -- 8.5.1 A Model with Only Lag1 -- 8.6 Further Directions -- Review Exercises.

9. Multivariate Analysis of Variance (MANOVA) and Discriminant Analysis -- 9.1 Why Technically Most Univariate Models are Actually Multivariate -- 9.2 Should I Be Running a Multivariate Model? -- 9.3 The Discriminant Function -- 9.4 Multivariate Tests of Significance: Why They Are Different from the F-Ratio -- 9.4.1 Wilks' Lambda -- 9.4.2 Pillai's Trace -- 9.4.3 Roy's Largest Root -- 9.4.4 Lawley-Hotelling's Trace -- 9.5 Which Multivariate Test to Use? -- 9.6 Performing MANOVA in Python -- 9.7 Effect Size for MANOVA -- 9.8 Linear Discriminant Function Analysis -- 9.9 How Many Discriminant Functions Does One Require? -- 9.10 Discriminant Analysis in Python: Binary Response -- 9.11 Another Example of Discriminant Analysis: Polytomous Classification -- 9.12 Bird's Eye View of MANOVA, ANOVA, Discriminant Analysis, and Regression: A Partial Conceptual Unification -- 9.13 Models "Subsumed" Under the Canonical Correlation Framework -- Review Exercises -- 10. Principal Components Analysis -- 10.1 What Is Principal Components Analysis? -- 10.2 Principal Components as Eigen Decomposition -- 10.3 PCA on Correlation Matrix -- 10.4 Why Icebergs Are Not Good Analogies for PCA -- 10.5 PCA in Python -- 10.6 Loadings in PCA: Making Substantive Sense Out of an Abstract Mathematical Entity -- 10.7 Naming Components Using Loadings: A Few Issues -- 10.8 Principal Components Analysis on USA Arrests Data -- 10.9 Plotting the Components -- Review Exercises -- 11. Exploratory Factor Analysis -- 11.1 The Common Factor Analysis Model -- 11.2 Factor Analysis as a Reproduction of the Covariance Matrix -- 11.3 Observed vs. Latent Variables: Philosophical Considerations -- 11.4 So, Why is Factor Analysis Controversial? The Philosophical Pitfalls of Factor Analysis -- 11.5 Exploratory Factor Analysis in Python -- 11.6 Exploratory Factor Analysis on USA Arrests Data.

Review Exercises -- 12. Cluster Analysis -- 12.1 Cluster Analysis vs. ANOVA vs. Discriminant Analysis -- 12.2 How Cluster Analysis Defines "Proximity" -- 12.2.1 Euclidean Distance -- 12.3 K-Means Clustering Algorithm -- 12.4 To Standardize or Not? -- 12.5 Cluster Analysis in Python -- 12.6 Hierarchical Clustering -- 12.7 Hierarchical Clustering in Python -- Review Exercises -- References -- Index -- EULA.

---