
CHAPTER 5

Correlation and linear regression

5.1 Correlation

Let $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ represent n points on a scatterplot. Then the **correlation coefficient**, denoted by r , is the average of the products of the z -scores, except that we divide by $n - 1$ instead of n . That is

$$r = \frac{1}{n - 1} \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{s_x} \right) \left(\frac{y_i - \bar{y}}{s_y} \right) \quad (5.1)$$

where s_x and s_y are the standard deviation for x and y respectively.

Equivalently, the correlation coefficient can be given as

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

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Table of Contents Chapter 7 Correlation Of Light Fields Springer

1. Understanding the eBook Chapter 7 Correlation Of Light Fields Springer
 - The Rise of Digital Reading Chapter 7 Correlation Of Light Fields Springer
 - Advantages of eBooks Over Traditional Books
2. Identifying Chapter 7 Correlation Of Light Fields Springer
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Chapter 7 Correlation Of Light Fields Springer
 - User-Friendly Interface
4. Exploring eBook Recommendations from Chapter 7 Correlation Of Light Fields Springer

- Personalized Recommendations
 - Chapter 7 Correlation Of Light Fields Springer User Reviews and Ratings
 - Chapter 7 Correlation Of Light Fields Springer and Bestseller Lists
5. Accessing Chapter 7 Correlation Of Light Fields Springer Free and Paid eBooks
 - Chapter 7 Correlation Of Light Fields Springer Public Domain eBooks
 - Chapter 7 Correlation Of Light Fields Springer eBook Subscription Services
 - Chapter 7 Correlation Of Light Fields Springer Budget-Friendly Options
 6. Navigating Chapter 7 Correlation Of Light Fields Springer eBook Formats
 - ePub, PDF, MOBI, and More
 - Chapter 7 Correlation Of Light Fields Springer Compatibility with Devices
 - Chapter 7 Correlation Of Light Fields Springer Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Chapter 7 Correlation Of Light Fields Springer
 - Highlighting and Note-Taking Chapter 7 Correlation Of Light Fields Springer
 - Interactive Elements Chapter 7 Correlation Of Light Fields Springer
 8. Staying Engaged with Chapter 7 Correlation Of Light Fields Springer
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Chapter 7 Correlation Of Light Fields Springer
 9. Balancing eBooks and Physical Books Chapter 7 Correlation Of Light Fields Springer
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Chapter 7 Correlation Of Light Fields Springer
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Chapter 7 Correlation Of Light Fields Springer
 - Setting Reading Goals Chapter 7 Correlation Of Light Fields Springer
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Chapter 7 Correlation Of Light Fields Springer

- Fact-Checking eBook Content of Chapter 7 Correlation Of Light Fields Springer
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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