

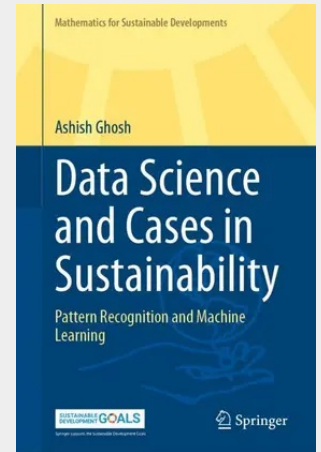
## Data Science and Cases in Sustainability

Pattern Recognition and Machine Learning

This book discusses the fascinating world of data science and cases in sustainability focusing on topics related to pattern recognition and machine learning, emphasizing applications that directly address topics related to SDG 9 (Industry, Innovation and Infrastructure). Recognizing the sustainable applications of big data, this text emphasizes the shift from traditional statistical analyses to more sophisticated methods. Each of these techniques—pattern recognition and machine learning—plays a crucial role in extracting hidden knowledge from vast amount of data. Targeted to students, researchers and professionals, it highlights the multidisciplinary and sustainable nature of the field and showcasing real-world applications and equips the readers to navigate the data-driven future.

The first of the two volumes, the book highlights the multidisciplinary nature of data science in the fields of computer science, statistics, physics and economics. It meticulously guides its readers through the data science workflow, covering data collection, preparation, storage, analysis, management and visualization. It highlights specific techniques and algorithms used in each of the above-mentioned stages and offers explanations of major learning mechanisms: dimensionality reduction, classification, clustering and outlier analysis. Additionally, it sheds light on the modern field of deep learning and unfolds the complexity of its mechanism with explanation. Case studies showcase the practical applications and successes of data science across various domains.

Chapter 1. Evolution of Data Science.- Chapter 2. Learning Dimensionality Reduction.- Chapter 3. Types of Data.- Chapter 4. Pre-processing of Data.- Chapter 5. Dimensionality Reduction.- Chapter 6. Pattern Recognition System.- Chapter 7. Classification.- Chapter 8. Classifiers.- Chapter 9. Combination of Classifiers.- Chapter 10. Clustering.- Chapter 11. Clustering Algorithms.- Chapter 12. Outliers.- Chapter 13. Fuzzy Set Theoretic Approach to Pattern Recognition.- Chapter 14. Rule of Thumb.- Chapter 15. Artificial Neural Networks.- Chapter 16. Multilayer Perceptron.- Chapter 17. Evolutionary Computing for Machine Learning.- Chapter 18. Support Vector Machine.- Chapter 19. Kernel Machines.- Chapter 20. Extreme Learning Machines.- Chapter 21. Deep Learning.



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