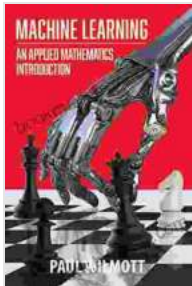


# Machine Learning: An Applied Mathematics Introduction



## Machine Learning: An Applied Mathematics

**Introduction** by Paul Wilmott

★★★★☆ 4.5 out of 5

Language : English

File size : 19222 KB

Screen Reader : Supported

Print length : 290 pages



## Unveiling the Mathematical Foundations of Machine Learning

In today's data-driven world, machine learning (ML) has emerged as a transformative force, empowering us to extract valuable insights from vast and complex datasets. While ML finds applications in countless domains, from healthcare to finance, its foundations lie firmly in the realm of applied mathematics.

In this comprehensive guide, we delve into the captivating intersection of mathematics and ML, providing a rigorous and accessible to the field. Whether you're a mathematician seeking to expand your horizons or an aspiring ML practitioner eager to grasp the underlying mathematical principles, this book is your indispensable companion.

### Chapter 1: Mathematical Prerequisites

We begin by establishing a solid mathematical foundation, covering essential topics such as linear algebra, probability theory, and calculus.

These concepts serve as the building blocks of ML algorithms, allowing us to represent data, model relationships, and make predictions.

## **Chapter 2: Supervised Learning**

Next, we explore supervised learning, where we train algorithms to map input data to desired outputs. We delve into linear regression, logistic regression, and decision trees, studying their mathematical formulations and performance characteristics. By understanding these techniques, you'll gain the ability to solve a wide range of classification and regression problems.

## **Chapter 3: Unsupervised Learning**

In unsupervised learning, we uncover hidden patterns and structures within unlabeled data. We examine clustering algorithms, such as k-means and hierarchical clustering, and explore techniques for dimensionality reduction, including principal component analysis (PCA) and singular value decomposition (SVD). These methods enable us to extract meaningful insights from large and complex datasets.

## **Chapter 4: Reinforcement Learning**

Reinforcement learning introduces a dynamic setting where agents interact with their environment, learning through trial and error. We investigate Markov decision processes (MDPs) and explore algorithms like Q-learning and policy gradients. These techniques empower agents to make optimal decisions in complex and uncertain environments.

## **Chapter 5: Advanced Topics**

For those seeking a deeper understanding, we venture into advanced topics including kernel methods, support vector machines (SVMs), and neural networks. We explore the mathematical underpinnings of these powerful techniques and examine their applications in various domains, from image recognition to natural language processing.

## **Benefits of Learning Machine Learning with Applied Mathematics**

- **Deep Understanding:** By grounding ML in mathematical principles, you'll develop a profound understanding of the algorithms and techniques, rather than relying solely on intuition or black-box approaches.
- **Problem-Solving Prowess:** Mathematics provides a rigorous framework for problem-solving, enabling you to tackle complex ML challenges with confidence and precision.
- **Adaptability to New Challenges:** As the ML landscape evolves, a solid mathematical foundation will empower you to adapt to new algorithms and techniques with ease, staying at the forefront of the field.

Machine Learning: An Applied Mathematics is an essential resource for anyone seeking to master the mathematical foundations of this transformative field. Whether you're a seasoned mathematician or a budding ML practitioner, this book will guide you on an enriching journey, unlocking the full potential of data and empowering you to make a meaningful impact in the world.

Embark on this intellectual adventure today and discover the captivating intersection of mathematics and machine learning.



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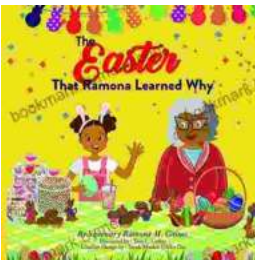
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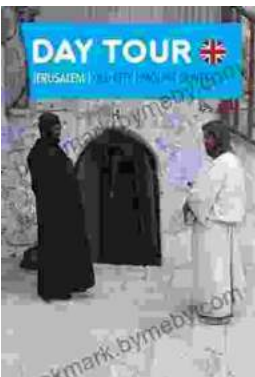
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