Mathematics for Machine Learning

Companion webpage to the book "Mathematics for Machine Learning". Copyright 2019 by Marc Peter Deisenroth, A Aldo Faisal, and Cheng Soon Ong. To be published by Cambridge University Press.

View the Project on GitHub at https://github.com/

Please link to this site using https://mml-book.com.

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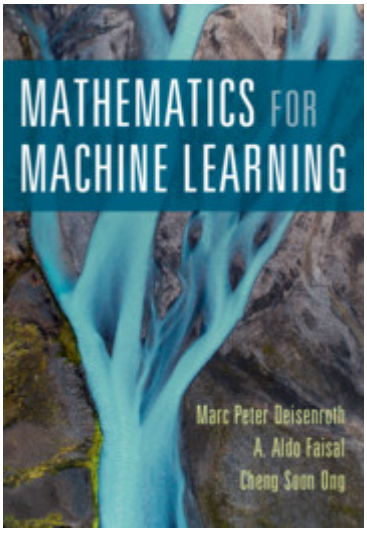

We wrote a book on Mathematics for Machine Learning that motivates people to learn mathematical concepts. The book is not intended to cover advanced machine learning techniques because there are already plenty of books doing this. Instead, we aim to provide the necessary mathematical skills to read those other books.

The book will be published by Cambridge University Press in early 2020.

We split the book into two parts:

- Mathematical foundations
- Example machine learning algorithms that use the mathematical foundations

We aim to keep this book fairly short, so we don’t cover everything.

We will keep PDFs of this book freely available after publication.

Download the PDF of the book

Table of Contents

Part I: Mathematical Foundations

1. **Introduction and Motivation**
2. **Linear Algebra**
3. **Analytic Geometry**
4. **Matrix Decompositions**
5. **Vector Calculus**
6. **Probability and Distribution**
7. **Continuous Optimization**

Part II: Central Machine Learning Problems

8. **When Models Meet Data**
9. **Linear Regression**
10. **Dimensionality Reduction with Principal Component Analysis**
11. **Density Estimation with Gaussian Mixture Models**

12. **Classification with Support Vector Machines**

Report errata and feedback.

We submitted the final draft for copy-editing. Therefore, any issues you raise now may not make it into the printed version.

Tutorials

We are working on jupyter notebook tutorials for the machine learning parts:

1. Linear Regression
2. Gaussian Mixture Models
3. PCA
4. SVM (work in progress)