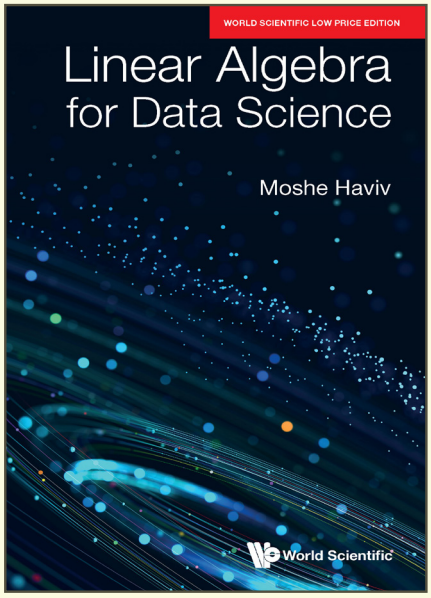
Linear Algebra for Data Science



By **Moshe Haviv**
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The Hebrew University of Jerusalem, Israel)

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ABOUT THE BOOK

This book serves as an introduction to linear algebra for undergraduate students in data science, statistics, computer science, economics, and engineering. The book presents all the essentials in rigorous (proof-based) manner, describes the intuition behind the results, while discussing some applications to data science along the way.

The book comes with two parts, one on vectors, the other on matrices. The former consists of four chapters: vector algebra, linear independence and linear subspaces, orthonormal bases and the Gram–Schmidt process, linear functions. The latter comes with eight chapters: matrices and matrix operations, invertible matrices and matrix inversion, projections and regression, determinants, eigensystems and diagonalizability, symmetric matrices, singular value decomposition, and stochastic matrices. The book ends with the solution of exercises which appear throughout its twelve chapters.

READERSHIP

Undergraduate course in linear algebra as part of a major in data science, statistics, computer science, economics, and engineering.

CONTENTS

- Invertible Matrices and the Inverse Matrix
- The Pseudo-Inverse Matrix, Projections and Regression
- Determinants
- Eigensystems and Diagonalizability
- Symmetric Matrices
- Singular Value Decomposition
- Stochastic Matrices
- Solutions to Exercises

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ABOUT THE AUTHOR

Moshe Haviv holds a BSc. (1979) in mathematics from Tel Aviv University, and MA (1982) and PhD (1983) in operations research from Yale University. He joined the department of statistics at the Hebrew University in 1984 and with some intermissions, mostly at the University of British Columbia and at the University of Sydney, has been there since, serving as head of department in 2008–2012. He retired as Professor in 2020, when he joined the School of Data Science at the Chinese University of Hong Kong, Shenzhen. He was also the president of the Operations Research Society of Israel, 2012–2015.

His research areas are queueing systems in general and strategic decision making in queues, in particular. Other areas of interest are numerical issues in large Markov chains, and Markov decision processes. Among his publications are a book titled *To queue or not to queue: Equilibrium behaviour in queueing systems*, co-authored with Refael Hassin and published by Kluwer in 2003; and a textbook *Queues: A Course in Queueing Theory* (2013) by Springer. He has also published 85 research papers in refereed journals.

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