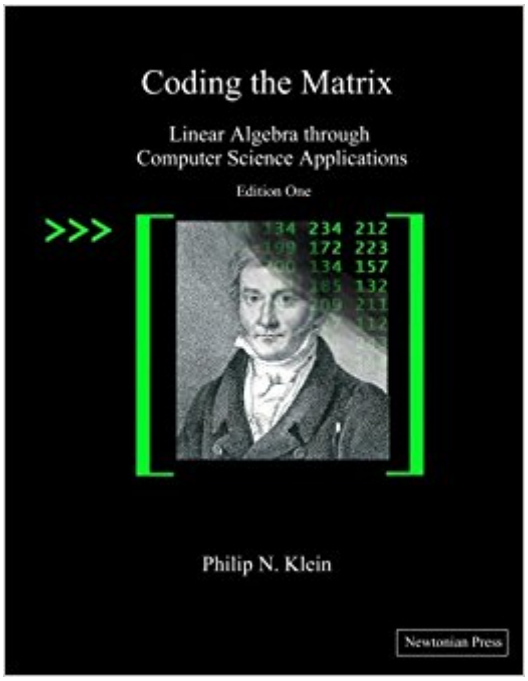
Coding The Matrix: Linear Algebra Through Applications To Computer Science



Synopsis

An engaging introduction to vectors and matrices and the algorithms that operate on them, intended for the student who knows how to program. Mathematical concepts and computational problems are motivated by applications in computer science. The reader learns by doing, writing programs to implement the mathematical concepts and using them to carry out tasks and explore the applications. Examples include: error-correcting codes, transformations in graphics, face detection, encryption and secret-sharing, integer factoring, removing perspective from an image, PageRank (Google's ranking algorithm), and cancer detection from cell features. A companion web site, codingthematrix.com provides data and support code. Most of the assignments can be auto-graded online. Over two hundred illustrations, including a selection of relevant xkcd comics. Chapters: The Function, The Field, The Vector, The Vector Space, The Matrix, The Basis, Dimension, Gaussian Elimination, The Inner Product, Special Bases, The Singular Value Decomposition, The Eigenvector, The Linear Program

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Customer Reviews

Philip Klein is Professor of Computer Science at Brown University. He was a recipient of the National Science FoundationÃ¢â ¬â„¢s Presidential Young Investigator Award, and has received multiple research grants from the National Science Foundation. He has been made an ACM Fellow in recognition of his contributions to research on graph algorithms. He is a recipient of Brown UniversityÃ¢â ¬â„¢s Award for Excellence in Teaching in the Sciences. Klein received a B.A. in

Applied Mathematics from Harvard and a Ph.D. in Computer Science from MIT. He has been a Visiting Scientist at PrincetonÃ¢â ¬â„¢s Computer Science Department, at MITÃ¢â ¬â„¢s Mathematics Department, and at MITÃ¢â ¬â„¢s Computer Science and Artificial Intelligence Laboratory (CSAIL), where he is currently a Research Affiliate. Klein has worked at industry research labs, including Xerox PARC and AT&T Labs, and he has been Chief Scientist at three start-ups. Klein was born and raised in Berkeley, California. He started learning programming in 1974, and started attending meetings of the Homebrew Computer Club a couple of years later. His love for computer science has never abated, but in a chance encounter with E. W. Dijkstra in 1979, he was told that, if he wanted to do computer science, he had better learn some math. His favorite xkcd is 612.

This review is specific to the Kindle version of the book.The textbook as intended is excellent. As many other readers have noted going back several years, the 1st edition of this book had an over abundance of typographical errors which have been corrected in more recent print versions. advertises the publication date for the Kindle version as April 7, 2015 but it contains all of the original typographical errors.When I purchased the Kindle version I knew about the typographical errors of the first edition and I also knew that the recent print editions had been corrected. I purchased the Kindle version as it had a very recent publication date and I was reasonably expecting that it would have been based on a corrected version of the text. I was really disappointed that this was not the case.While existing print copies of a book can’t be updated, the same is not true for digital formats. has cheapened the Kindle brand by selling old versions of books and tagging them with recent publication dates. should be correcting the Kindle version and providing updated versions to all of the readers who have purchased faulty copies.

I rarely write book reviews but I am compelled to write one for Coding the Matrix. This book first caught my attention when a course by the same name was offered at Coursera. I did not enroll in the course but instead bought the book for self study at some stage. This year, I spent 5 months working through the problems in the book (I am down to the last 2 of the 14 chapters) and I just want to say that I really wish there was a book like this in bookstores 20 years ago. What a fantastic way to teach Linear Algebra!! Previously, I had tried working through Gilbert Strang’s book and video lectures on Linear Algebra but the material never stuck in my head. This book is quite different in its approach because it spends a lot of time providing the intuition behind fundamental concepts. What is the intuition behind a Matrix? What is the "meaning" of Matrix multiplication? What really is a

Vector Space? What is the relationship between a Matrix and a Function? The author goes about explaining these basic concepts using a combination of worked exercises and hands on Python implementations. After working through this book I am convinced that implementing Linear Algebra algorithms and applying them to real world problems is the most effective way to learn the subject.The hard copy book has several typos and errors but the Kindle version has been updated to fix most of these. Still, before you start, I suggest downloading the errata from the book's website just to be sure. The book has a short intro on Python which I thought was quite sufficient to tackle the programming exercises. This book requires real hard work if you want to get through it. Many times (especially in the Orthogonalization and Special Bases chapters) I found the going tough. But don't be discouraged - it is worth the effort. Now I really understand what QR factorization is about. SVD? No worries. The chapter on SVD starts with the absolute basics to explain how to derive the SVD formula and what the various component matrices really mean. I don't think I will ever see a A * A' multiplication in any other book without recollecting the beautiful explanation of orthonormal vectors from this book. The sad part for me is that I had to use all these concepts in the past working as a quant analyst at a bank, not knowing what these concepts really meant. So yeah, I wish it was published ages ago.Thank you Prof Klein for writing this book. The teaching technique you have employed for such a complicated topic is unique and effective. Looking forward to the next edition.

I am am a retired software engineer who spent my entire career working for an aero-space research company. I have a master's degree in mathematics including graduate level linear algebra. And yet, it took me years on the job to relate the books to the problems we were solving. Professor Klein does much of it with this book. For me, it is the perfect mix of abstract mathematics with real physical problems. I deeply regret not having it back then.

This book is takes a fairly unique approach to introducing linear algebra. Unlike a lot of linear algebra texts, it provides a large number of examples and applications using real world scenarios (error correcting codes, encryption, etc.) It is well written, with some humorous touches here and there. It uses Python to implement the algorithms, but these sections can easily be skipped if you just want to use the text as an intro to linear algebra.Another plus is that the Kindle edition is a print facsimile, which means mathematical expressions are rendered properly and at a size that is easily readable. This is an aggravating problem with most Kindle books for technical subjects. The only downside is that there is no index.There are a few curious errors: in one diagram the numeral 1 is

consistently replaced by an exclamation point (!). In another diagram, the Greek letter theta is replaced in several spots by, again, an exclamation point. These issues do not, however, detract from the overall value of the book and I highly recommend it.

I’m only partially through this text, so please bear that in mind. With its presentation of applications, many tangents of historical interest, and ’interactive code exercises I find this to be one of the better presentations on Linear Algebra and Computer Science.It’s been fun to compare Professor Klein’s ideas along side Gilbert Strang’s texts.Also I must give a high five to Prof Klein and all parties for their effort to keep this book affordable! The book is well worth your time and money!

I really like the book . Hope the Kindle version gets better . Some of the diagrams / printing is not legible . I am sure will take a note of this I always have had great customer experience with