COLA

computational oriented linear algebra

First Edition

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Zhang Jinrui
NewArea, China

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This book was typeset using LaTeX software.
To those who love and hate me.

Preface

The current textbook in linear algebra is very abundant, include the linear operator oriented approach, which is the currently best one I have ever seen.

This book will base on a computational oriented approach to the subject of the so called linear algebra.Linear algebra is such a vast topic that I'm having the most firghtened heart to output what I have learnt so far in this amazing land.

In this book, the main goal is to answer all the questions about those are not well pondered in the traditional linear algebra course of any kind. In the computational matrix theory there are plenty ways of decompose the matrix, such as LU, QR, and the most fundamental SVD decomposition. While in the more math oriented linear course the main topic are always in the most abstract way as they move forward. And the main concepts such as the Transpose, dule space, determinant, trace and all other fundamental but always treated just in a forced memorize level.

The main goal is to explain all the concepts in a more mathematical natrual and fun way, even the sudden expose of a certain defination would be a very hard problem to those first expose to the abstract algebra world student just like me. So I'll try my best to get every defination and notion in a smooth and more reasonalbe way.

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0 PreTalks

the first thing to think about is how we mearsure things.

1.1 Tensor oriented for computation

1.1.1 Examples of (a,b)-Tensor $\forall a, b \in \mathbb{N}$

$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is a (1,1)-Tensor which is often refer as a matrix.

$\begin{bmatrix} 1 \\ 3 \end{bmatrix}$ is a (0,1)-Tensor which is often refer as a vector.

$\begin{bmatrix} 1 & 3 \end{bmatrix}$ is a (1,0)-Tensor which is called the covector.

The covector are also know as the linear functional. come togeter with the concepts that are called the dule space and dule vectors.

1.1.2 (0,1)-Tensor the vector

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1.1.3 (1,0)-Tensor the covector

1.1.4 (1,1)-Tensor the linear maps

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the first thing to think about is how we mearsure things.

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