Numerical Analysis

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Abstract

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1 Numerical Techniques for Linear Algebra

1.1 Solving For Solutions

For an $n \times m$ matrix M, we use the notation $a_{i,j}$ to mean the element at the (i, j)th position. We refer to the ith row as R_i and the jth column as C_j.

Definition 1.1.1: The Gauss-Jordan Elimination Method

Let $M \in M_{n\times m}(\mathbb{R})$. The Gauss-Jordan elimination method computes the row echelon form of M using the following algorithm. For $1 \leq i \leq m$, repeat the following steps:

1. Step 1: Find the pivot of the ith column.
2. Step 2: Swap the the ith row with the row containing the pivot.
3. Step 3: For $j \neq i$, replace R_j with $R_j - \frac{a_{i,i}}{a_{j,i}} R_i$.

Definition 1.1.2: The Gaussian Elimination Method

Let $M \in M_{n\times n}(\mathbb{R})$.

Definition 1.1.3: LU Decomposition

Definition 1.1.4: QR Decomposition

1.2 Singular Value Decomposition

Definition 1.2.1: Singular Value Decomposition