Implementation of LU Decomposition in C

Numerical Analysis Presentation

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Introduction

- Review of LU Decomposition, with a focus on Doolittle's Algorithm.
- Implementation of LU Decomposition in 'C'.
- Way forward

LU Decomposition Recap

- LU Decomposition decomposes a matrix A into a lower triangular matrix L and an upper triangular matrix U such that:

$$A = LU$$

- Doolittle's algorithm fills the diagonal of L with 1s and computes other values by row-wise elimination.

Code Overview

- The following code reads a matrix, performs LU Decomposition, and optionally solves systems or calculates determinants.
- Code split into three files:
  - ‘functions.h‘ - Header file
  - ‘functions.c‘ - Contains function implementations
  - ‘main.c‘ - Contains the main logic and user interaction

Way Forward

- The range of inputs can be expanded using other mathematical constants($\pi, e, ...$)
- Support Complex Matrices is not present. The program currently handles only real matrices.

References

[1] William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery. *Numerical Recipes in C*. Cambridge University Press, Cambridge, USA, second edition, 1992.

[2] B.W. Kernighan and D.M. Ritchie. *The C Programming Language: 2nd Edition*. Prentice Hall, 1988.

Thanks for your Time!