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Part 1: The Hilbert Matrix

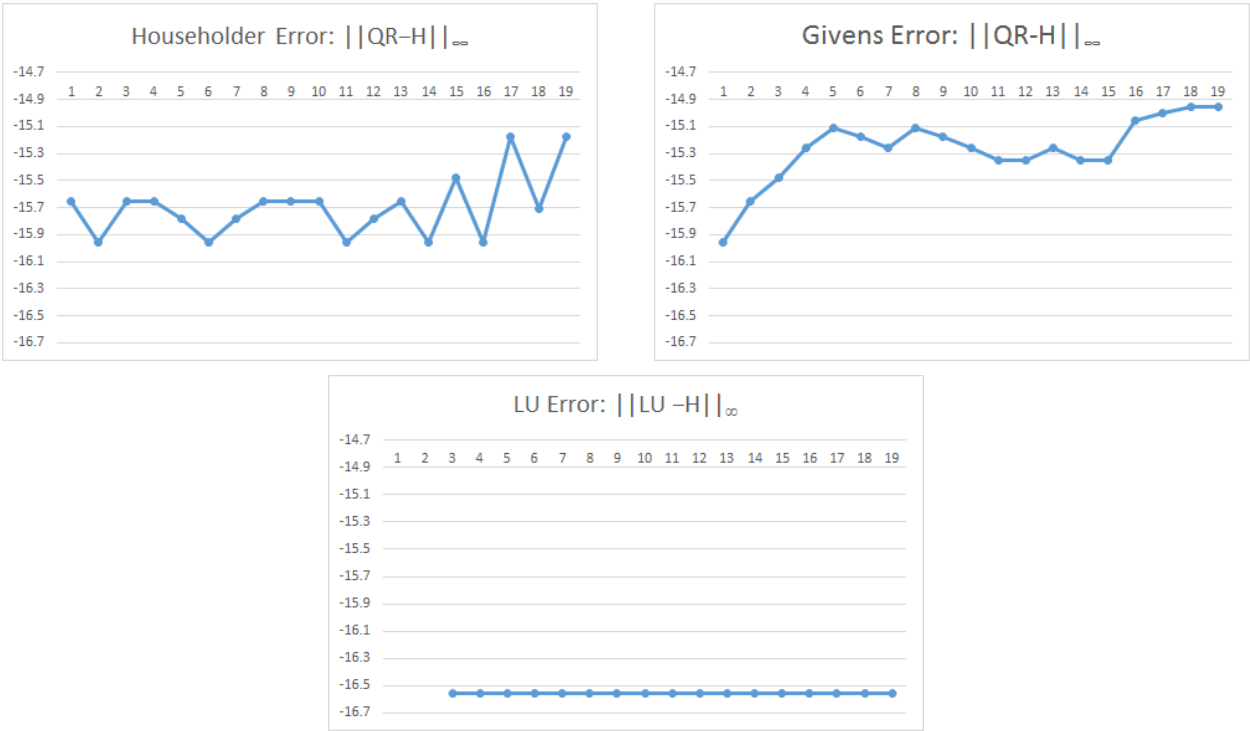
It is justified to use the LU or QR-factorizations as opposed to calculating an inverse matrix because both LU and QR-factorization are four times more efficient than calculating an inverse matrix¹.

Along with efficiency, the condition errors through LU and QR factorization methods are smaller as evidenced by the accompanying graphs. As logarithmic representations of the data values, the errors are very small and increase very slowly over iterations.

Each individual method has its own strengths. LU decomposition is about twice as fast as the QR decompositions and its error is consistently low. Givens can be more easily parallelized than Householder.

1. Trahan - Computational Time for Finding the Inverse of a Matrix

Figures 1 - 3: Logarithmically Scaled Graphs of Decomposition Error



Figures 4-6: Logarithmically Scaled Graphs of Solution Errors

