Math 5601 Independent Study Project Proposal

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For my independent study project in Math 5601, I plan to study the `maxvol` algorithm for computing the CUR decomposition of a matrix [1].

I will attempt to fulfill two goals for this project.

1. I will explain in my own words the theoretical estimates provided in [1].
   (a) For this part, I will read the paper and rewrite the important definitions and proofs with more explanation, details and commentary.
2. I will create a NumPy implementation of the `maxvol` algorithm as it is described in [1].
   (a) First, I will create my own pseudocode description of the algorithm based on the theoretical understanding gained from the first part of the project.
   (b) Second, I will convert the pseudocode into actual Python code, implementing matrices using NumPy.
   (c) Third, I will test the algorithm on random matrices (following [1]) to validate that it is correct and that the method is effective.

References

[1] S. A. Goreinov, I. V. Oseledets, D. V. Savostyanov, E. E. Tyrtyshnikov, and N. L. Zamarashkin. *How to Find a Good Submatrix*, pages 247–256. WORLD SCIENTIFIC, April 2010.