

MATH 513 Spring 2009, Homework 12, Addendum

Two problems on SVD and data compression...

Suppose A is a large $M \times N$ matrix and that $A = U\Sigma V^T$ is its singular value decomposition. Recall that Σ is a diagonal matrix with nonnegative entries.

Problem 1 If we throw away the small entries of Σ , so that only L nonzero diagonal entries remain, show that we only need to store $L(M + N)$ numbers rather than the MN of them needed to store A .

Problem 2 Why would this compression scheme fail if U and V were arbitrary, non-orthogonal matrices? Give an example using Matlab and small-ish (10x10 is sufficient) matrices.