Project 1

Data Compression

Image Compression using SVD

Data compression is an important application of linear algebra. The need to minimize the amount of digital information stored and transmitted is an ever growing concern in the modern world. Singular Value Decomposition is an effective tool for minimizing data storage and data transfer.

Provide a report that explores image compression through the use of singular value decomposition on image matrices. Give an illustrative example. The report should include the following sections:

1. A brief introduction to SVD including a small dimension SVD for a small matrix A for illustration
2. Image Compression Example. Select a test image and apply SVD to the image. Display the image for different rank-k matrices, provide the corresponding compression ratios, theoretical error in approximation for each rank and root mean square error RMSE.
3. **Bonus point :** Demonstrate how SVD can be used to remove noise from images.