Application Of SVD

Image Compression

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Summary:

Images are represented in a rectangular array where each element corresponds to the grayscale value for that pixel**.** Singular value decomposition (SVD) is a linear algebra technique where a matrix is factored into a product of three matrices, that is $\mathbf{A = U\Sigma V^T}$. (**U** - matrix of left singular vectors in the columns,**Σ** - diagonal matrix with singular values,**V** - matrix of right singular vectors in the columns).Σ is a diagonal matrix and its entries are called singular values. Interestingly for an image, only the top few singular values contain most of the "information" to represent the image. We are planning to do Image Compression of a given image, by converting it to Grayscale and then compressing it so that we get an image of accurate size(bytes). One application of SVD is data compression. Given a data matrix A (for instance an image), SVD can help to find a low-rank matrix which is a good approximation of the original data matrix.

In this project, we have created a very basic image compression algorithm. Given a colored image, the algorithm will calculate the singular value decomposition of the image matrix. Then it will find the grayscale image, and by compressing it till we get the expected image.

Libraries being used:

- ➔ Numpy
- ➔ Matplotlib
- ➔ PIL(python image library)
- ➔ OS(Operating System)