

Parallel Image Compression & Decompression Using SVD

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Introduction

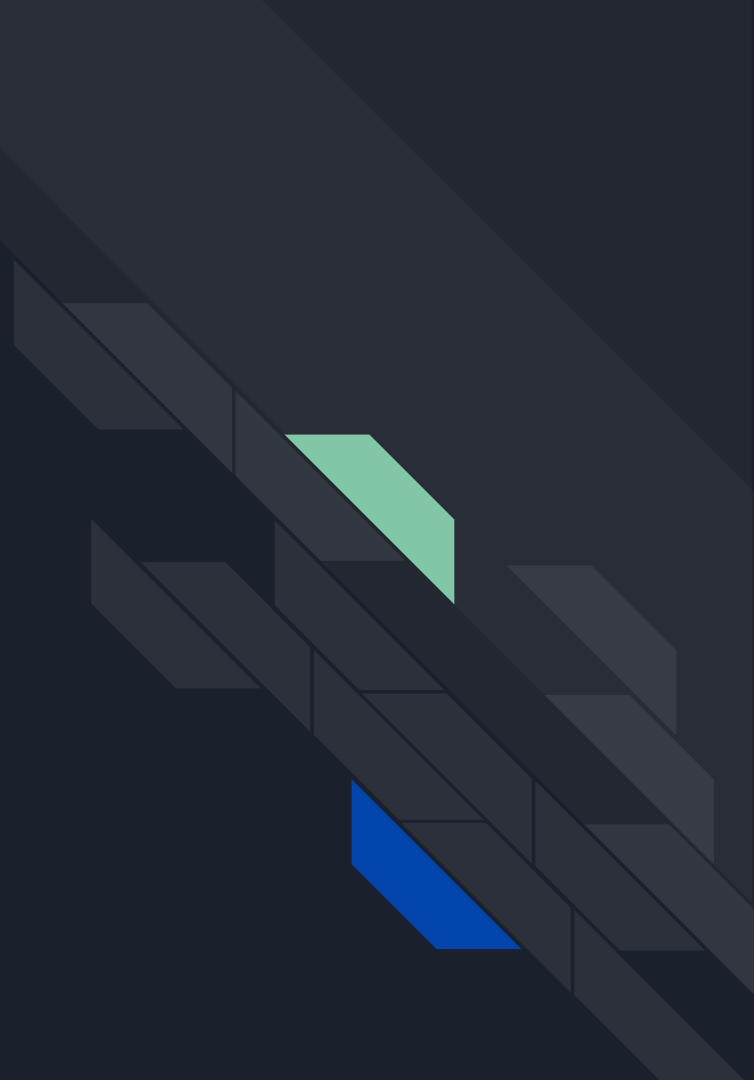
Principal Component Analysis (PCA) gives the is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables (entities each of which takes on various numerical values) into a set of values of linearly uncorrelated variables called principal components.

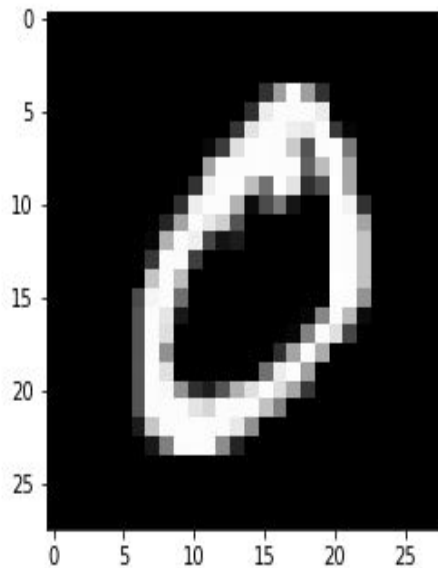


Jacobi Rotation to find SVD

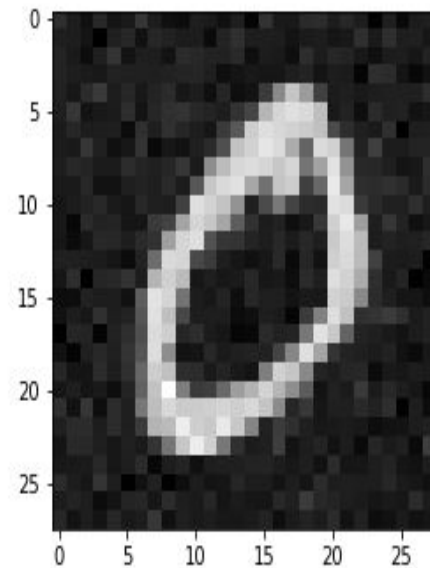
A one-sided Jacobi Rotation involves a sequence of column or row orthogonalizations. Here, we select an index pair (p,q) and determine the Jacobi Rotator such that the columns of $AJ(p,q,\theta)$ are orthogonal to each other.

Results after compression

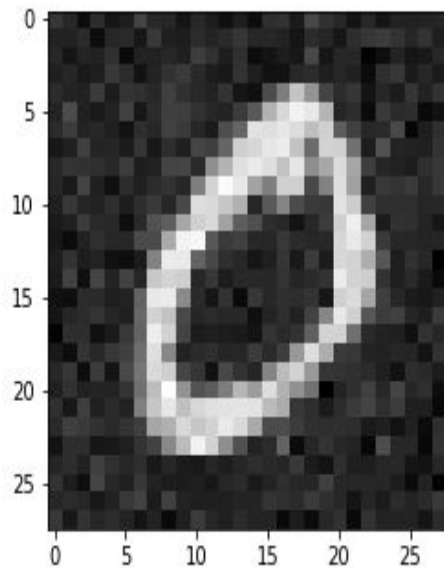




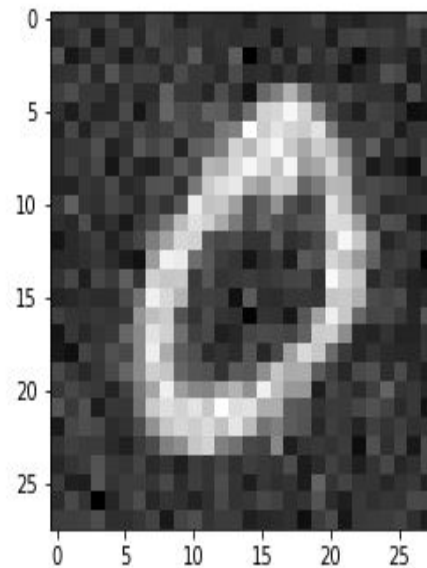
A Image Of Zero
784 features



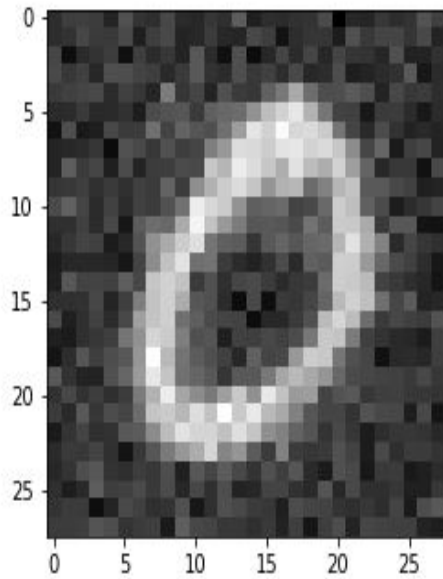
10% Tolerance
Reconstructed from compressed matrix
With 705 features



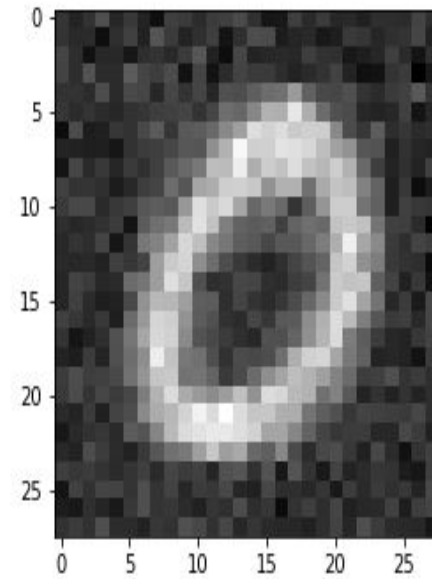
20% Tolerance
Reconstructed from compressed matrix
With 627 features



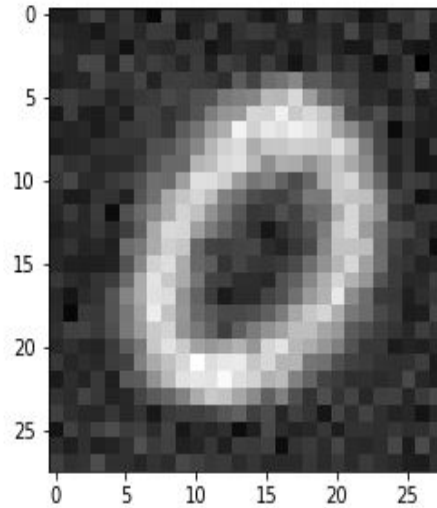
40% Tolerance
Reconstructed from compressed matrix
With 470 features



60% Tolerance
Reconstructed from compressed matrix
With 314 features

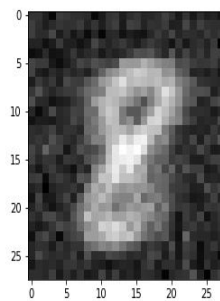
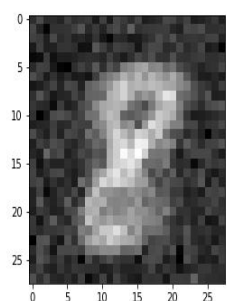
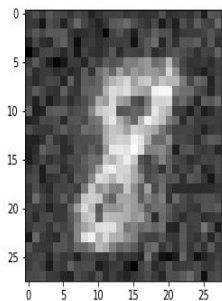
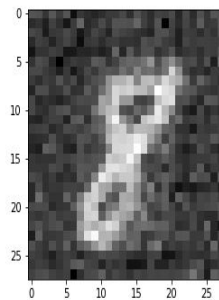
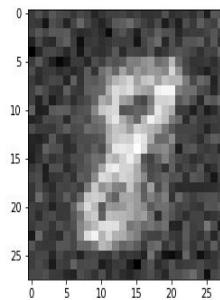
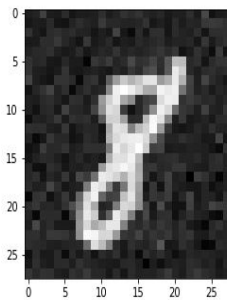
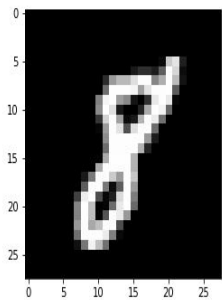


80% Tolerance
Reconstructed from compressed matrix
With 157 features



90% Tolerance
Reconstructed from compressed
matrix
With 78 features

Similar results for '8'

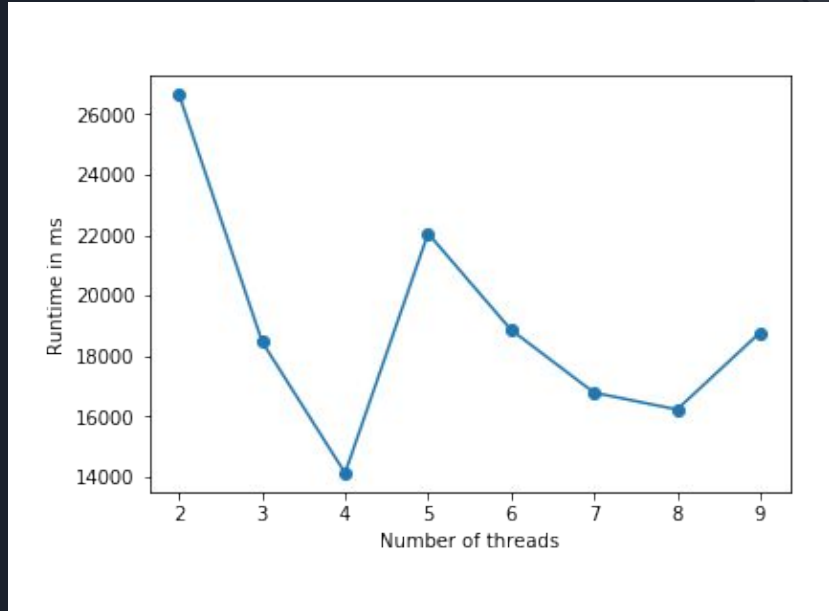


Number of threads vs Runtime

The background features a series of dark gray, three-dimensional rectangular planes that recede into the distance, creating a sense of depth. Two of these planes are highlighted: one in a light green color and another in a bright blue color, both positioned towards the right side of the frame.

Number of threads	Runtime (ms)
2	26644
3	18465
4	14121
5	22051
6	18860
7	16780
8	16223
9	18770
Serial Code	326427

Plot of threads vs runtime



Thank you

