

CS 663 - Fundamentals of Digital Image Processing

Assignment 4

Gagan Jain - 180100043
Hitesh Kandala - 180070023

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1 SVD

Here are some implementational details

- We calculate the eigen values and eigen vectors of the matrices $A^t A$ and AA^t . The eigen vectors respectively correspond to the rows of the left and right matrices U and V .
- We sort the rows in the order of decreasing eigen values.
- We know that the diagonal matrix S has the diagonal values equal to the square root of the eigen values of either AA^t or $A^t A$ depending upon which has smaller size. So, we feed these values after we have them in sorted order.
- Now we check if the vectors in AU and V are in the same direction or not. In case they are opposite in direction, we flip the row of V so that they point in the same direction.
- Finally we have the matrices U , V and S such that $A = USV^t$. This is checked in the main script on a random matrix and the error is less than 10^{-10} , which indicates the correctness of the implementation.