Assignment1 report

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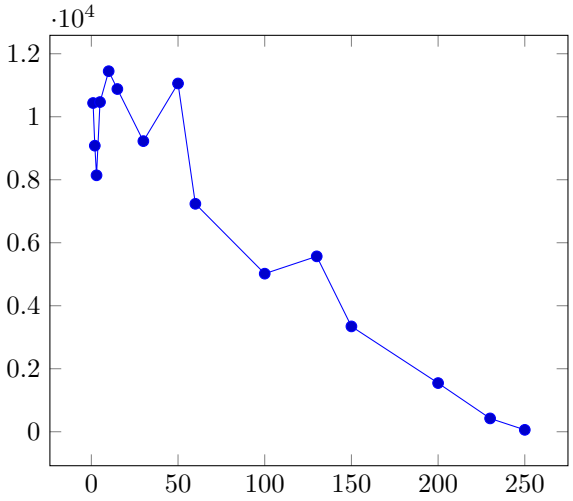
January 2022

MOTIVATION :

we are given a square gray scale image which can be represented as a 2-D matrix of the intensities . The matrix can be seen as a matrix obtained after performing series of elementary transformations on a diagonal matrix that is , every element of the matrix can be represented as a weighted sum of the diagonal entities of the above diagonal matrix. In this assignment we focus on two such ways to decompose or factorise the matrix namely Eigen value decomposition and singular value decomposition . We perform some experiments to observe the properties of the above decompositions.

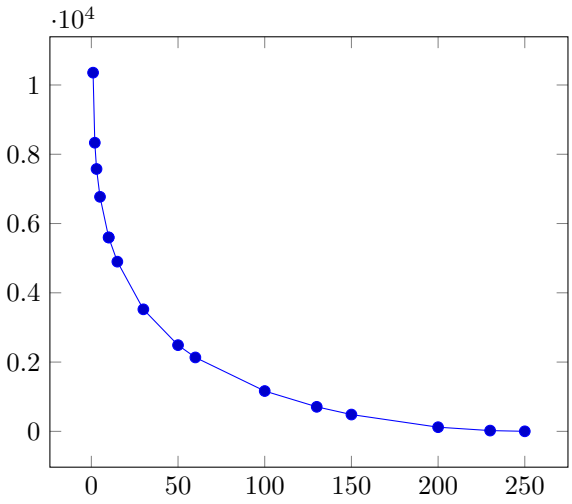
EXPERIMENTAL RESULTS :

(i) Eigen value decomposition



in the above graph , x-axis represents k value and y axis represents the frobenius norm of the error matrix (given image - reconstructed image)

(ii) Singular value decomposition



in the above graph , x-axis represents k value and y axis represents the frobenius norm of the error matrix (given image - reconstructed image)

INFERENCE :

(i) from the reconstructed images :

We can see that for both EVD and SVD , for around k = 30 we can see most of the essence of the image . Around k = 100 , the reconstructed image becomes almost clear (less clear in case of EVD) . If we compare the reconstructed images of EVD and SVD for same value of k , we can see that SVD produces much clear image than that of EVD.

(ii) from the frobenius norm of error images :

We can see that the norm is not monotonic in case of EVD , but the norm decreases if we consider two values of k that are far apart (that is for k = 1 and k = 100) . But, in case of SVD , the norm is monotonically decreasing and also the curve is concave upwards that implies that the decrease of the norm is maximum at the starting (for small values of k). We can also observe that , for the same value of k , SVD has the error image norm lesser than that of EVD , which support the observation that for same value of k , SVD produces more clear image than EVD.