

**Department of Computer Science and Engineering(UG Studies)**

**PES University, Bangalore-560085**

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| **Session :** Aug - Dec 2017  **Credits :** 0-0-2-0-1 | UE14CS405 : Machine Learning Lab |
| **Lab # : 11** | Implement Singular Value Decomposition |

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| Lab 9:  Implement Singular Value Decomposition |
| DataSet:  Iris data set  Given below is the 1st 10 rows of the Iris dataset where the columns are sepal length,sepal width, petal length, petal width. class attribute is not taken.  4.9,3.0,1.4,0.2  4.7,3.2,1.3,0.2  4.6,3.1,1.5,0.2  5.0,3.6,1.4,0.2  5.4,3.9,1.7,0.4  4.6,3.4,1.4,0.3  5.0,3.4,1.5,0.2  4.4,2.9,1.4,0.2  4.9,3.1,1.5,0.1  5.4,3.7,1.5,0.2 |
| **Singular Value Decomposition**  Any matrix can be decomposed into  **A*nxp*= U*nxn* S*nxp* VT*pxp***  Where  **U**T**U** = **I**nxn  **V**T**V** = **I**pxp (i.e. U and V are orthogonal)  Calculating the SVD consists of finding the eigenvalues and eigenvectors of *AAT* and *ATA*. The eigenvectors of *ATA* make up the columns of *V* , the eigenvectors of *AAT* make up the columns of *U*. Also, the singular values in **S** are square roots of eigenvalues from *AAT* or *ATA*. The singular values are the diagonal entries of the *S* matrix and are arranged in descending order. The singular values are always real numbers. If the matrix *A* is a real matrix, then *U* and *V* are also real. |
| To Do list:Fill the missing code and obtain the output |
| OUTCOME:  1)Dimentionality Reduction Technique  2)Any matrix can be Decomposted into U, Sigma and V transpose form  3)Faster compared to PCA |