

# ASSIGNMENT 2

## PCA AND SVD

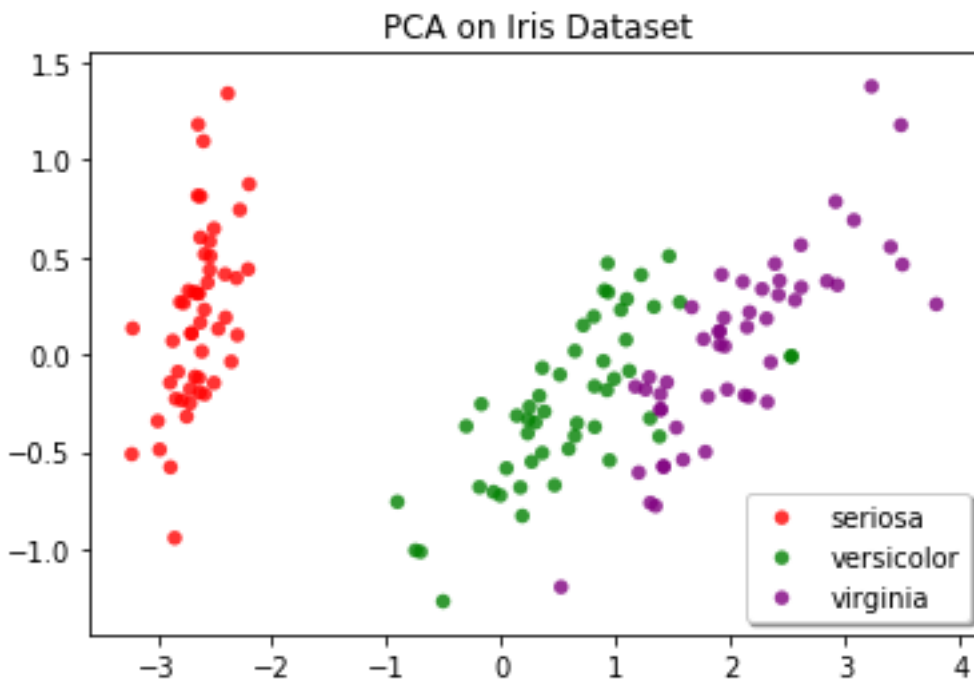
NAHUSHA ACHARYA PES1201700044

KEERTHAN G PES1201700963

PUSHPENDAR SINGH PES1201700243

**Principal component analysis (PCA)** 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**. This transformation is defined in such a way that the first principal component has the largest possible **variance** (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it is **orthogonal** to the preceding components. The resulting vectors (each being a **linear combination** of the variables and containing  $n$  observations) are an uncorrelated **orthogonal basis set**. PCA is sensitive to the relative scaling of the original variables.

Applying PCA on iris data set:



SVD:-

In **linear algebra**, the **singular value decomposition (SVD)** is a **factorization** of a **real** or **complex matrix**. It is the generalization of the **eigendecomposition** of a **positive semidefinite normal matrix** (for example, a **symmetric**

[matrix](#) with non-negative eigenvalues) to any  $m \times n$  matrix via an extension of the [polar decomposition](#). It has many useful applications in [signal processing](#) and [statistics](#).

Applying SVD o iris data set-

