**18.Singular value Decomposition**

**Matrix decomposition, also known as matrix factorization, involves describing a given**

**matrix using its constituent elements.**

**The Singular-Value Decomposition, or SVD for short, is a matrix decomposition method for**

**reducing a matrix to its constituent parts in order to make certain subsequent matrix**

**calculations simpler. This approach is commonly used in reducing the no: of attributes in**

**the given data set.**

**M= U ∑V^T**

** M-is original matrix we want to decompose**

** U-is left singular matrix (columns are left singular vectors). U columns contain**

**eigenvectors of matrix MMᵗ**

** Σ-is a diagonal matrix containing singular (eigen) values.**

** V-is right singular matrix (columns are right singular vectors). V columns contain**

**eigenvectors of matrix MᵗM**

**Numpy provides a function for performing svd, which decomposes the given matrix into 3**

**matrices.**

**Write a program to perform the SVD of a given matrix. Also reconstruct the given matrix**

**from the 3 matrices obtained after performing SVD.**

print("Sivapriya Rajan")  
print("SJC21MCA-2042")  
  
import numpy as np  
A = np.array([[2, 1, -2],  
 [3, 0, 1],  
 [1, 1, -1]])  
  
U, D, VT = np.linalg.svd(A)  
print("Decomposed value of U :")  
print(U)  
print()  
print("Decomposed value of D :")  
print(D)  
print()  
print("Decomposed value of VT :")  
print(VT)  
print()  
  
A\_remake = (U @ np.diag(D) @ VT)  
print("The SVD of a given matrix. :")  
print(A\_remake)