PCA using SVD

Given an arbitrary matrix A of size d x n were d>>n

Denote R(d x d) to be covariance matrix  and inverse, n x n matrix.

We decompose matrix *A* using SVD as follows: 

Substituting into  we have that 

Thus, 

Since V is unitary and S is diagonal we get that  s.t. 

Given - PCA for the reduced size matrix

Then 

Where 