1

Data Matrix: $D \quad m \times n \quad m > n$

Covariance, $D^T D$

Eigen functions, eigen values:

$[e, \lambda] = eig(D^T D);$

$D^T D e = e \lambda$

$D^T D = e \lambda e^T$

$A = De;$ PCs

Singular Value Decomposition

$D = U S V^T$

$D^T D = V S^T U^T U S V^T$

$\qquad = V S^T S V^T$

$\qquad = V S^2 V^T$

$\left\{ \begin{array}{l} V \text{ is equivalent to } e \\ S^2 \quad \text{''} \quad \text{''} \quad \text{to } \lambda. \end{array} \right.$

$A = US;$ PCs