

ROZKŁAD SVD

$$A = P \cdot D \cdot Q^T$$

↑
1 (A^T A)

m x n

$$(A^T A) \leftarrow A$$

$A A^T$

n x n

$r = \text{rank}(A)$

$$\begin{bmatrix} \sigma_1 & & & 0 \\ & \ddots & & \\ & & \sigma_r & \\ 0 & & 0 & \ddots & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 \\ \vdots \\ 3 \end{bmatrix} = \begin{bmatrix} \vdots \\ \vdots \\ \vdots \end{bmatrix} \begin{bmatrix} \sigma_1 & 0 \\ 0 & \sigma_2 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} \vdots \\ \vdots \end{bmatrix}$$

UNITARNE

W. SVD: σ_1, σ_2

$$\Theta = \begin{bmatrix} \sigma_0 c_1 & & \\ \sigma_0 c_1 & & \\ \sigma_0 c_m & & \\ \hline \sigma_1 c_1 & & \\ \vdots & & \\ \sigma_{s-1} c_m & & \end{bmatrix}$$

m x s

rank A = 1

$$A = \begin{bmatrix} \sigma_0 c_1 & \sigma_1 c_1 & \dots & \sigma_{s-1} c_1 \\ \sigma_0 c_2 & \sigma_1 c_2 & \dots & \sigma_{s-1} c_2 \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_0 c_m & \sigma_1 c_m & \dots & \sigma_{s-1} c_m \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_m \end{bmatrix} \cdot [\sigma_0, \sigma_1, \dots, \sigma_{s-1}]$$