

SVD ← Singular Value Decomposition
 Wartości własne

$$\begin{bmatrix} \vdots \\ \vdots \\ \vdots \end{bmatrix} \begin{bmatrix} \vdots & \vdots & \vdots \end{bmatrix} = \begin{bmatrix} \vdots \\ \vdots \\ \vdots \end{bmatrix}$$

$$2 \times 3 \cdot 3 \times 2 = 2 \times 2$$

Dowolna A

$$A^T A$$

$$A A^T$$

$$\begin{matrix} & m \times m & & n \times n \\ A = & P & \cdot & D & \cdot & Q^T \\ m \times n & & m \times n & & \end{matrix}$$

KAŻDA MACIERZ
 A
 DA SIĘ...

P, Q - UNITARNE

D - DIAGONALNA

$$\begin{bmatrix} \sigma_1 & & 0 \\ & \sigma_2 & \\ 0 & & \sigma_r \\ & & & 0 \end{bmatrix} \quad \sigma - \text{W. WŁASNE}$$

$\sigma_1, \sigma_2, \dots, \sigma_r, 0, 0, \dots$
 $r = \text{rank}(A)$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \\ -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{bmatrix}$$