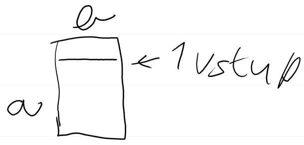
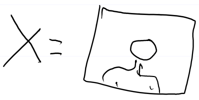
Linear Auto-asociation memory

vstupy - v matici X



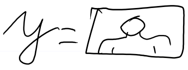
$W = X \cdot X^+$ $[a \times a]$



$X^+ = X^T (X \cdot X^T)^{-1}$ $n < N$

$(X^T \cdot X)^{-1} \cdot X^T$ $n > N$

x - nový vektor



$y = W \cdot x$

y - x premietnuté do roviny vstupov

$n = (1 - W) \cdot x$

→ novelty

Ak chceme pridávať vstupy po jednom:

GENERAL INVERSE

1.) vypočítame kolmú zložku $z_i = x_i - W_{i-1} \cdot x_i$

2.) upravíme maticu $W_i = W_{i-1} + \frac{z_i \cdot z_i^T}{|z_i|^2}$

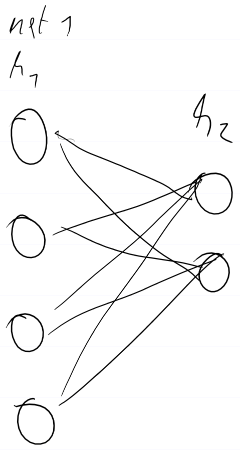
CMM

- namiesto inverzie transponujeme

$W_{n+1} = W_n + x_{n+1} \cdot x_{n+1}^T$

$R \begin{bmatrix} & \end{bmatrix}_{n \times n}$ $\qquad R \cdot u = \lambda u$

eigenvalue eigenvector



$$g_1 = f'(net_1) \odot w^T @ g_2$$

PCA

1. $R = X^T \cdot X$ $\qquad X$ - matica vstupov
   R - kovar. matica

2. $R u_i = \lambda_i u_i$ $\qquad$ nájdem všetky eigen-veci

3. zoradím λ - $\lambda_1 \geq \lambda_2 \geq \ldots \geq \lambda_n$
   spolu s u

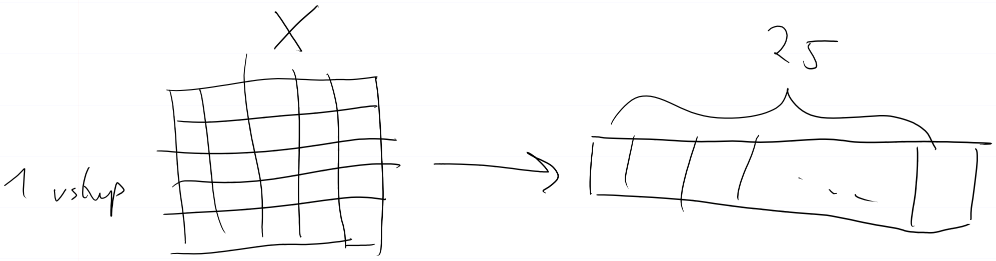
4. vytvorím
   veľká λ — $\Lambda = \begin{bmatrix} \lambda_1 & 0 & \cdots & 0 \\ 0 & \lambda_2 & & \vdots \\ 0 & 0 & \cdots & \lambda_n \end{bmatrix}$ $\qquad U = \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_n \end{bmatrix}$

5. vyrátam $a = U^T x$

6. urežem z U - nechám k potrebných dimenzií $\Rightarrow U'$

7. $x' = U' \cdot a$ $\qquad x'$ - redukovaná dimenzia - výstup

Bonus: $e = x - x'$ $\qquad$ reconstruction error


X
1 vstup
25