다음주 강의

- 사전강의 2개 ⟶ 보고서 작성
- 본강의 : 1개 ⟶ 역할 O, 숙 X

실습.

강당과 강다혜 MMS로.

Inclass 21: Principal Component Analysis

[SCS4049] Machine Learning and Data Science

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Python

① 랜덤 샘플 생성.

② 생체신호 데이터.

③ 이미지 데이터.

$X \in \mathbb{R}^{N \times D}$

N개의 샘플, D차원.

$$X = \begin{bmatrix} 2 & 1 \\ 1 & 1 \\ 0 & 1 \\ 1 & 2 \\ 2 & 2 \end{bmatrix}_{5 \times 2} \qquad v_1 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

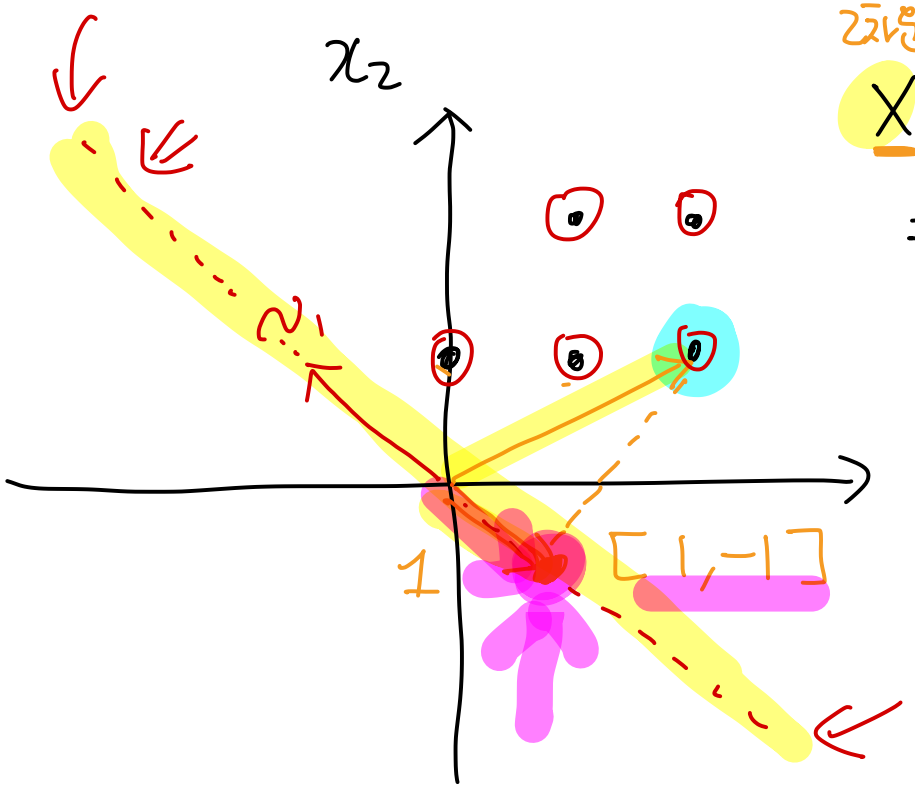
$$Xv_1^T = Z$$

$5 \times 2 \quad 2 \times 1 \quad 5 \times 1$

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

$C \in \mathbb{R}^{2 \times 2}$

$C = U \Sigma V^T$ $\quad V \rightarrow$ 기저벡터축들.



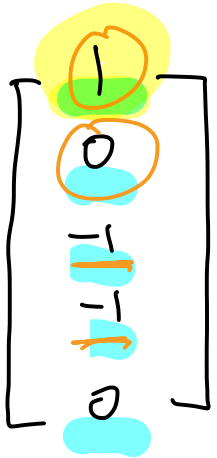
$X v^T = Z$

2차원

$X v^T$

$= Z =$

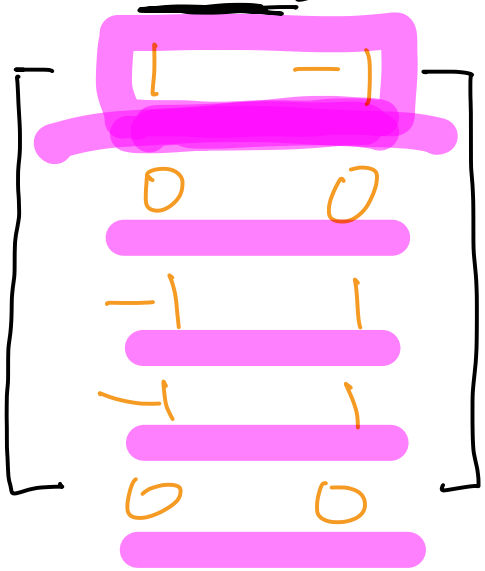
1차원.



차원이 축소된 값 (projection).

reconstruction.

2차원 직선상에.



span.

$Z \cdot v =$

$5 \times 1 \quad 1 \times 2$

$v = [1 \ -1]$

v, v_1, v_2 column vector or row

X $N \times D$ $D \times N$

v_1 · X $X \cdot v$

Column vector $D \times 1$ · $N \times D$.

row vector $1 \times D$. $N \times D$. $X \cdot v^T$

$1 \times D$ $D \times N$. $v \cdot X$

① projection, dimensional reduction.

$v_1^T x$, 1차원

$\begin{bmatrix} v_1^T x \\ v_2^T x \end{bmatrix}$ 2차원

$\begin{bmatrix} v_1^T x \\ v_2^T x \\ v_3^T x \end{bmatrix}$

② reconstruction.

$v_1^T x \cdot \begin{bmatrix} | \\ v_1 \\ | \end{bmatrix}$ 1차원.

$v_1^T x \cdot \begin{bmatrix} | \\ v_1 \\ | \end{bmatrix} + v_2^T x \begin{bmatrix} | \\ v_2 \\ | \end{bmatrix}$ 2차원.

$v_1^T x \cdot \begin{bmatrix} | \\ v_1 \\ | \end{bmatrix}$
$+ v_2^T x \cdot \begin{bmatrix} | \\ v_2 \\ | \end{bmatrix}$
$+ v_3^T x \cdot \begin{bmatrix} | \\ v_3 \\ | \end{bmatrix}$

3차원.