Linear Algebra

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Summary So Far

$Ax = \lambda x \longrightarrow (A - \lambda I)x = 0$

det

차원 합 ②

$Nul A \subset \mathbb{R}^2$

$Row A \subset \mathbb{R}^2$

↳ NulA가 차원 1개면 RowA도 차원 1개, RowA가 차원 2개면 NulA는 0개

$\begin{array}{c} A \\ 3 \end{array}$ = $\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

A^T = $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$

ColA가 차원 2개면 NulA는 차원 1개

$Nul A^T \subset \mathbb{R}^3$

$Col A^T \subset \mathbb{R}^3$

- Eigenvalue and eigenvectors
- Null space, column space, and orthogonal complement in $\mathbb{R}^n$
- Diagonalization and eigendecomposition

$D = V^{-1}AV \Leftrightarrow A = VDV^{-1}$

동치관계

- Linear transformation via eigendecomposition

$A = VDV^{-1}x$

Linear Transformation via A^k

- Now, consider recursive transformation $A \times A \times \cdots \times A\mathbf{x} = A^k\mathbf{x}$.
- If A is diagonalizable, A has eigendecomposition

$$A = VDV^{-1}$$

- $A^k = (VDV^{-1})(VDV^{-1})\cdots(VDV^{-1}) = VD^kV^{-1}$
- D^k is simply computed as

$$D^k = \begin{bmatrix} \lambda_1^k & 0 & \cdots & 0 \\ 0 & \lambda_2^k & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & 0 & \lambda_n^k \end{bmatrix}$$