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SVD and rank-1 approximation

1分

A matrix A has the Singular Value Decomposition

$$A = \begin{bmatrix} | & | & \cdots & | \\ u_1 & u_2 & \cdots & u_m \\ | & | & \cdots & | \end{bmatrix} \begin{bmatrix} \sigma_1 & 0 & \cdots & 0 \\ 0 & \sigma_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & 0 \\ 0 & 0 & \cdots & \sigma_n \\ 0 & 0 & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & \cdots & 0 \end{bmatrix} \begin{bmatrix} - & v_1 & - \\ - & v_2 & - \\ \vdots & \vdots & \vdots \\ - & v_n & - \end{bmatrix}$$

with $\sigma_1 \geq \sigma_2 \geq \cdots \sigma_n \geq 0$.

What is the matrix B that has rank 1 and minimizes $\|A - B\|_2$?

选项*

○ $B = u_1 v_1^T$

○ $B = \sigma_1 v_1 u_1^T$

○ $B = \sigma_1 u_1 v_1^T$

○ $B = v_1 u_1^T$

保存回答　　提交最终回答