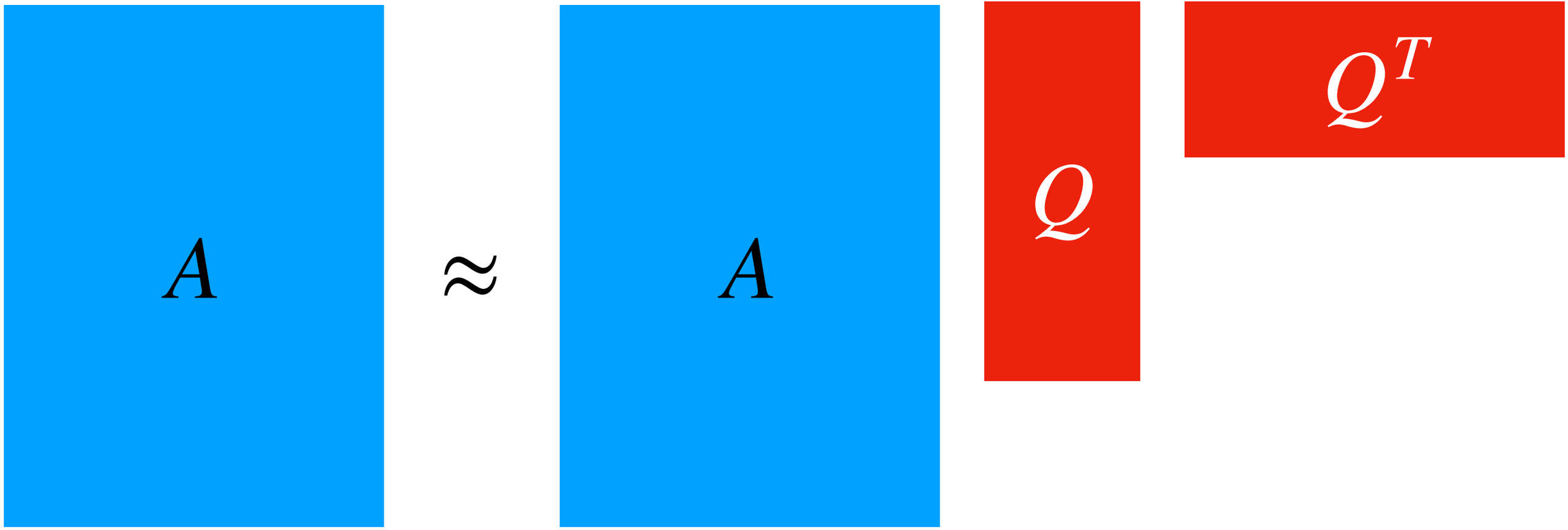
An Example Problem

Principal Component Analysis

- Given an $n \times d$ matrix A, compute a **good** rank-k orthonormal Q

$$A \approx A \cdot Q \cdot Q^T$$



- Columns of Q are the **Principal Components**

5

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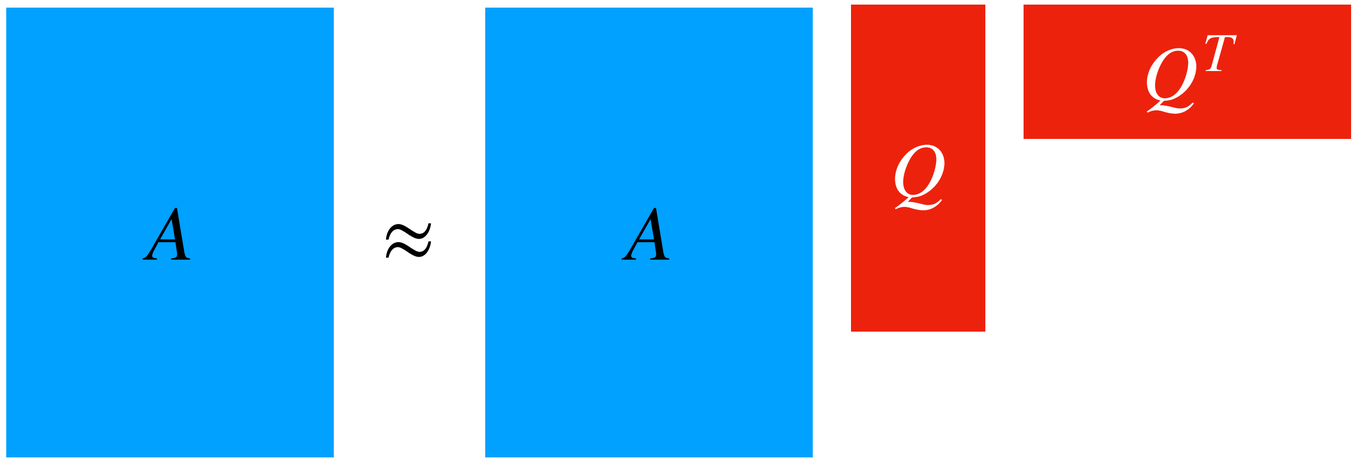

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Classic Setting

- The matrix A is available to us and can be arbitrarily accessed
- Compute SVD : nd^2 time
    - Very slow on modern datasets
    - Does not utilize sparsity