

An Example Problem

Principal Component Analysis

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

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



A

\approx



A



Q



Q^T

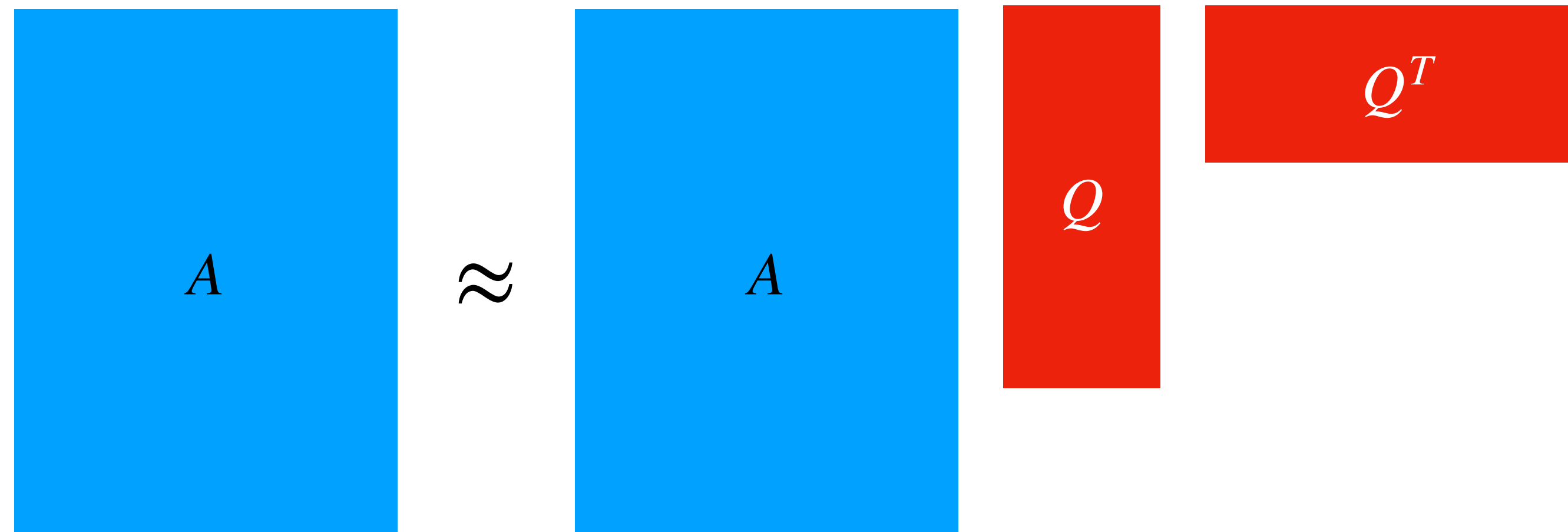
- Columns of Q are the Principal Components

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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