

$$A = U\Sigma V^T$$

$$= \left[\begin{array}{c|c|c} \underbrace{\begin{array}{c} u_1 \quad \dots \quad u_r \\ \vdots \\ u_{r+1} \quad \dots \quad u_m \end{array}}_{U_r} & \dots & \begin{array}{c} u_{r+1} \quad \dots \quad u_m \\ \vdots \\ u_{r+1} \quad \dots \quad u_m \end{array} \end{array} \right] \left[\begin{array}{c} \begin{array}{c} \sigma_1 \\ \vdots \\ \sigma_r \end{array} \\ \sigma_{r+1} \\ \vdots \\ \sigma_m \end{array} \right] \left[\begin{array}{c} \begin{array}{c} \vdots \\ \vdots \\ \vdots \end{array} \\ \vdots \\ \vdots \end{array} \right] \left. \begin{array}{c} v_1^T \\ v_r^T \\ v_{r+1}^T \\ \vdots \\ v_n^T \end{array} \right\} V_r$$