

Singular value decomposition of the matrix of movie ratings:

$$U = \begin{bmatrix} -0.6 & 0.1 & -0.3 & -0.2 & 0.2 & -0.7 & -0.2 \\ -0.5 & 0.1 & 0.8 & 0.2 & 0.1 & 0.1 & 0.1 \\ -0.1 & -0.6 & 0.2 & -0.7 & -0.4 & 0.0 & 0.0 \\ -0.1 & -0.5 & -0.1 & 0.7 & -0.4 & -0.1 & -0.2 \\ -0.5 & 0.1 & -0.3 & -0.1 & -0.1 & 0.7 & -0.4 \\ -0.1 & -0.6 & -0.1 & 0.0 & 0.8 & 0.1 & 0.2 \\ -0.3 & 0.1 & -0.3 & 0.0 & -0.3 & 0.1 & 0.8 \end{bmatrix} \quad \Sigma = \begin{bmatrix} 13.6 & 0 & 0 & 0 & 0 \\ 0 & 11.4 & 0 & 0 & 0 \\ 0 & 0 & 1.9 & 0 & 0 \\ 0 & 0 & 0 & 1.1 & 0 \\ 0 & 0 & 0 & 0 & 0.3 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$V = \begin{bmatrix} -0.6 & 0.1 & 0.0 & 0.7 & -0.4 \\ -0.1 & -0.7 & -0.1 & 0.3 & 0.6 \\ -0.5 & 0.1 & -0.7 & -0.4 & 0.2 \\ -0.1 & -0.6 & 0.0 & -0.4 & -0.7 \\ -0.5 & 0.1 & 0.7 & -0.4 & 0.3 \end{bmatrix}$$

$$\begin{bmatrix} 5 & 0 & 5 & 0 & 4 \\ 5 & 0 & 3 & 0 & 5 \\ 0 & 5 & 0 & 5 & 1 \\ 1 & 5 & 0 & 4 & 0 \\ 4 & 0 & 4 & 0 & 3 \\ 0 & 5 & 0 & 4 & 0 \\ 3 & 0 & 3 & 0 & 2 \end{bmatrix} \approx \begin{bmatrix} -0.6 & 0.1 \\ -0.5 & 0.1 \\ -0.1 & -0.6 \\ -0.1 & -0.5 \\ -0.5 & 0.1 \\ -0.1 & -0.6 \\ -0.3 & 0.1 \end{bmatrix} \cdot \begin{bmatrix} 13.6 & 0 \\ 0 & 11.4 \end{bmatrix} \cdot \begin{bmatrix} -0.6 & -0.1 & -0.5 & -0.1 & -0.5 \\ 0.1 & -0.7 & 0.1 & -0.6 & 0.1 \end{bmatrix}$$

Problem. A new movie “Captive State” was rated by the seven users as follows: 4, 4, 0, 1, 4, 0, 0. What kind of movie it is?