On collaborative rating problem

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Base line algorithm

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Formal definition

Define: U users and V rating options in the system

Given: A tensor $\mathbf{R} \in \Re^{U \times U \times V}$, each of its face $R_v \in \Re^{U \times U}$ is the pairwise rating matrix for v^{th} rating option.

- There are matrices $P \in \Re^{U \times k}$ and $W_v \in \Re^{k \times U}$, such that,

$$R_v = PW_v$$

- P stays fixed for $v \in \{1, 2, ..., V\}$

Base line algorithm

Objective Function

Goal: Minimize the Frobenius norm of the matrix completion problem

$$\min_{P, W_v} \sum_{v=1}^{V} ||PW_v - R_v||_F^2$$

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Ranking
Given: $A = \frac{1}{V} \sum_{v=1}^{V} R_v$

Score vector:

$$S = Tr[A^T Q A]$$

where, Q is a weighting matrix