1 Set preference model 1

The preference of user u on set S is estimated as,

$$\tilde{r}_{u,s} = \frac{1}{|S|}\boldsymbol{u}^T \sum_{i \in S} \boldsymbol{v_i}$$

The loss function to estimate the model is given by following:

$$\mathcal{L} = \sum_{u \in U} \sum_{S \in Z} (r_{u,s} - \tilde{r}_{u,s})^2 sim(S),$$

where Z denotes all the sets rated by the user u and the $sim(S)$ represents average similarity of the items in set S. The average similarity of the items in S is given by,

$$sim(S) = \frac{1}{\binom{|S|}{2}} \sum_{i,j \in S} \boldsymbol{v_i}^T \boldsymbol{v_j}$$

After learning the model, the preference of the user u on item i is given by,

$$\tilde{r}_{u,i} = \boldsymbol{u}^T \boldsymbol{v_i}$$

2 Set preference model 2

The preference of user u on set S is estimated as,

$$\tilde{r}_{u,s} = \frac{1}{|S|}\boldsymbol{u}^T \sum_{i \in S} \boldsymbol{v_i}$$

The loss function to estimate the model is given by following:

$$\mathcal{L} = \sum_{u \in U} \sum_{S \in Z} (r_{u,s} - \tilde{r}_{u,s})^2,$$

where Z denotes all the sets rated by the user u.

After learning the model, the preference of the user u on item i is given by,

$$\tilde{r}_{u,i} = \boldsymbol{u}^T \boldsymbol{v_i}$$

3 Matrix factorization baseline

The preference of user u on item i is given by,

$$\tilde{r}_{u,i} = \boldsymbol{u}^T \boldsymbol{v_i}$$

The model is learned by minimizing the following loss function:

$$\mathcal{L} = \sum_{u \in U} \sum_{i \in R_u} (\tilde{r}_{u,i} - r_{u,i})^2,$$

where R_u denotes the set of items rated by u.