Meta-Network Summary

段乐乐

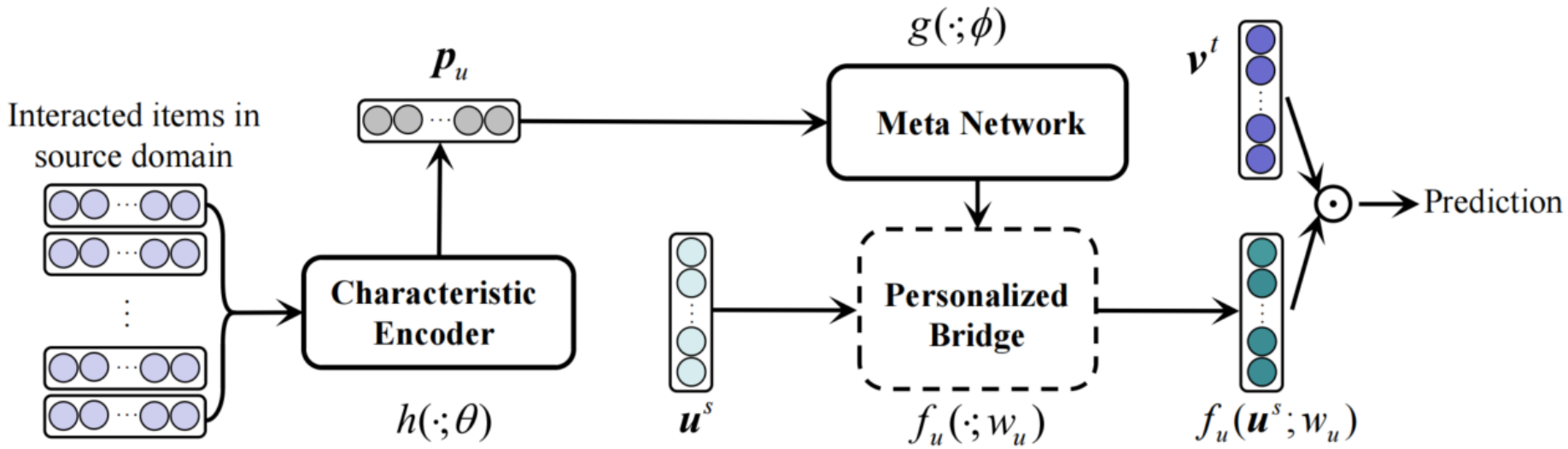

Figure 2: Personalized Transfer of User Preferences for Cross-domain Recommendation (PTUPCDR) utilizes a meta network with users' characteristic embeddings in the source domain as input to generate personalized bridge functions for each user. Then, with the personalized bridge function, we can obtain the transformed user's embeddings as the initial embeddings.

$$\boldsymbol{w}_{u_i} = g(\boldsymbol{p}_{u_i};\phi), \tag{3}$$

where $g(\cdot)$ is the meta network, which is parameterized by ϕ. In this paper, the meta network is a two-layer feed-forward network. The $\boldsymbol{w}_{u_i}$ is a vector whose size depends on the structure of the bridge function. The personalized bridge function is formulated as:

$$f_{u_i}(\cdot;\boldsymbol{w}_{u_i}), \tag{4}$$

which utilizes $\boldsymbol{w}_{u_i}$ as the parameters of bridge function $f(\cdot)$. The bridge function can be defined as any structure. In this paper, for simplicity, we use a linear layer as $f(\cdot)$ following EMCDR [8, 16]. Thus, to fit the size of bridge's parameters, we reshape the vector $\boldsymbol{w}_{u_i} \in \mathbb{R}^{k^2}$ into a matrix $\boldsymbol{w}_{u_i} \in \mathbb{R}^{k\times k}$. Note that the $\boldsymbol{w}_{u_i}$ is used as the parameters of the bridge functions rather than input. The generated bridge function depends on user's characteristics and varies from user to user, and we call it the personalized bridge function.

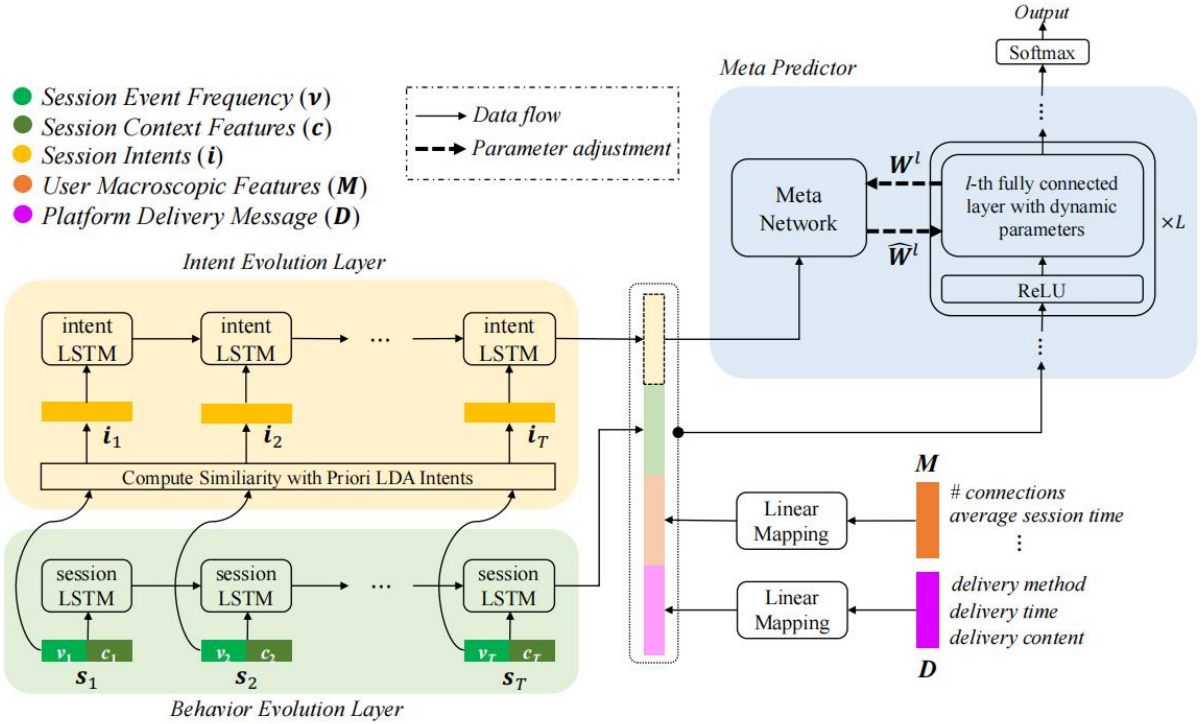

Figure 3: The framework of our proposed model. It consists of three main components: behavior evolution layer, intent evolution layer and a meta predictor.

5.3.1 ***Fully Connected Layers with Dynamic Parameters.*** As illustrated in Figure 4, assuming that the l-th FC-D layer transforms the input feature $\boldsymbol{h}^l \in \mathbb{R}^m$ into $\boldsymbol{h}^{l+1} \in \mathbb{R}^n$, and correspondingly assuming there are d basic learnable parameters $\boldsymbol{W}_1^l, \boldsymbol{W}_2^l, ..., \boldsymbol{W}_d^l \in \mathbb{R}^{(m*n)}$ in it, denoted as $\boldsymbol{W}^l = [\boldsymbol{W}_1^l, \boldsymbol{W}_2^l, ..., \boldsymbol{W}_d^l]^T \in \mathbb{R}^{d\times(m*n)}$. The l-th FC-D layer computes the following transformation:

$$\boldsymbol{h}^{l+1} = \widehat{\boldsymbol{W}}^l \cdot \boldsymbol{h}^l + \hat{\boldsymbol{b}}^l \tag{5}$$

where $\widehat{\boldsymbol{W}}^l \in \mathbb{R}^{m\times n}, \hat{\boldsymbol{b}}^l \in \mathbb{R}^n$ are the weights and bias of the l-th FC-D layer adjusted by the meta network.

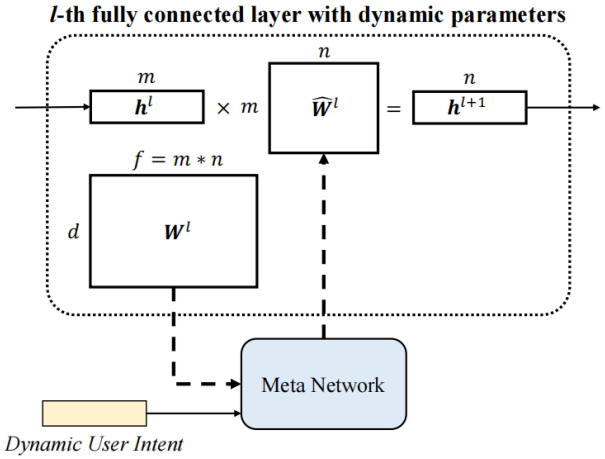

Figure 4: The l-th fully connected layers with dynamic parameters.

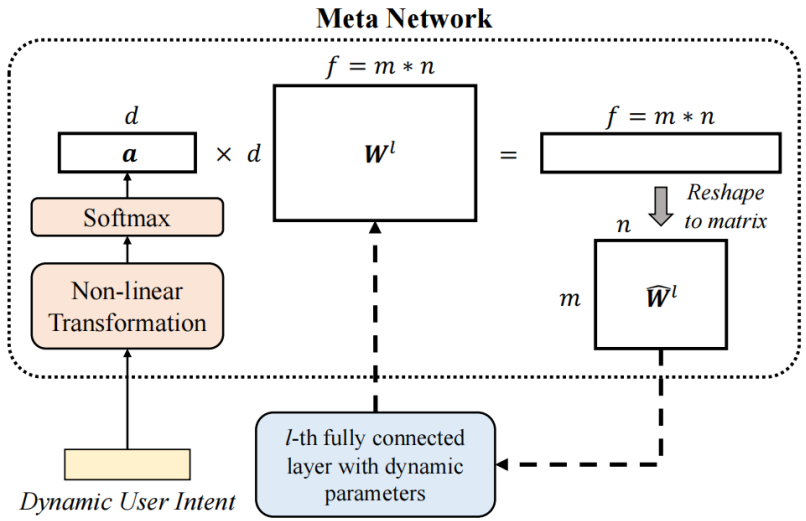

Figure 5: Meta Network.

Thank you!