Proposed Method

Interest Sustainability Prediction - Predictive Model and Feature

- Based on the frequency bins, design a RNN as a sequence encoder, adopt BILSTM, which has been effective to model sequential data.
- Design the predictive model with BILSTM as follows:
  - $M(f_i;\theta) = \sigma(\mathbf{w}^\top(\overrightarrow{LSTM}(f_i)\|\overleftarrow{LSTM}(f_i)) + c)$
  - $f_x = [b_1, b_2, \cdots, b_B] \in \mathbb{R}^B$: sequence of frequency bins of item i
  - σ: sigmoid function, $\mathbf{w} \in \mathbb{R}^{2l}$: trainable weight, $\mathbf{c} \in \mathbb{R}$: bias

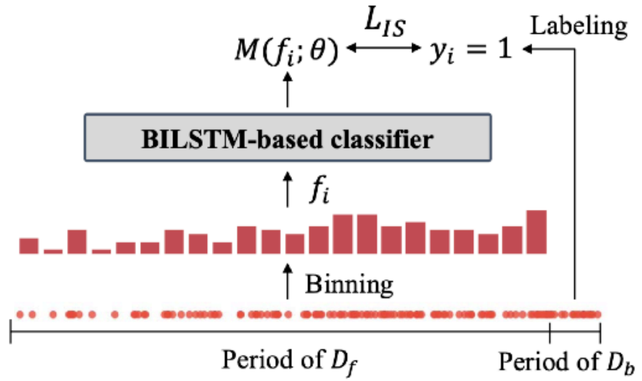
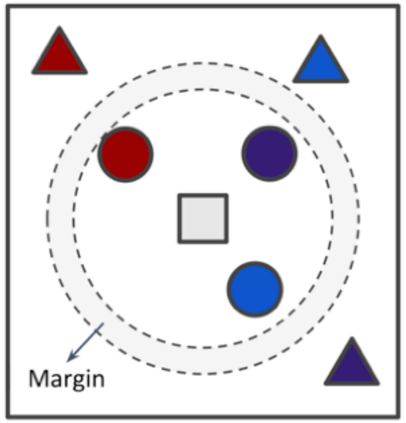


Fig. 2: Training process of a propose classifier on the interest sustainability prediction.

- Each LSTM encodes the feature f_i into l-dimentional vector, which obtained from their last hidden state.

Proposed Method

Metric Learning with Interest Sustainability Score



(a) CML

- Task: recommendation with the ISS p_i to model how users' interest in each item will sustain in the future.
- The basis of the proposed recommender system is a metric learning framework, which makes users closer to items consumed by them (positive items) than items not consumed by them (negative items) as shown in Fig.4a.
- Consumption-based objective L_C defined as follows:
  - $L_C(u, i^+, i^-) = [m + d(\mathbf{u}, \mathbf{i}^+) - d(\mathbf{u}, \mathbf{i}^-)]_+$
  - $[x]_+ = \max(x,0)$, $\mathbf{u}, \mathbf{i}^+, \mathbf{i}^- \in \mathbb{R}^K$: embedding vectors of user, positive / negative item