Proposed Method

Interest Sustainability Prediction - Predictive Model and Feature

- Given the classification problem, introduce f_i, M as shown in Fig.2.
- Intuitively, the consumption pattern of an item over time will be an important clue in determine consumed in the feature.
- To model the consumption patterns of items over time, we represent the timestamps at which an item was consumed as frequency bins:
  - item : $[t_1, t_2, \cdots, t_N] \xrightarrow{Binning} [b_1, b_2, \cdots, b_B]$
  - t_j : j-th timestamp at which an item was consumed
  - N: number of consumptions of the item in D_f

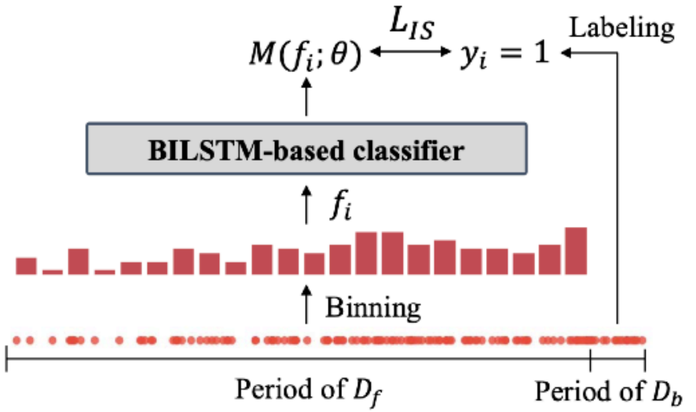

Fig. 2: Training process of a propose classifier on the interest sustainability prediction.

- b_k: number of times an item was consumed in the period of k-th frequency bin
- B: number of bins where $N \gg B$

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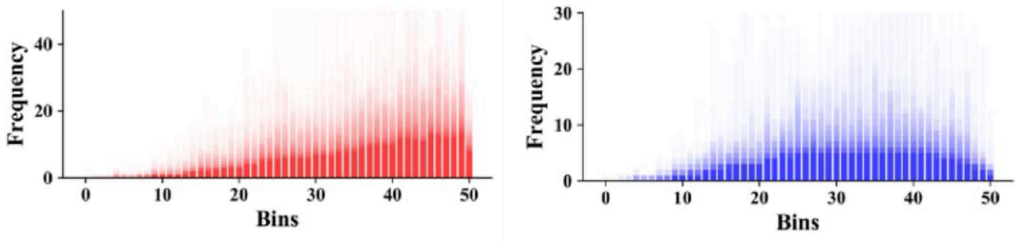
- To examine the benefit of the frequency bins, Fig.3 show the distribution of the frequency bins that belong to $y_i = 1$ or $y_i = 0$.
- Observe that the values in the frequency bins:
  - $y_i = 1$ tend to gradually increase over time
  - $y_i = 0$ tend to decrease in recent periods



(a) $y_i = 1$ (b) $y_i = 0$

Fig. 3: Distribution of frequency bins corresponding to 10,000 randomly-sampled items that belong to $y_i = 1$ (a) or $y_i = 0$ (b) on Yelp dataset.

- Therefore, use the features that capture the consumption patterns changing over time (sequence of frequency bins) to predict items will be consumed in the future.