HybridBERT4Rec: A Hybrid Recommender System Based on BERT

Sequential Content-Based and Collaborative Filtering

Leon Knorr | November 28, 2023

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Recap: Sequential Modelling & HybridBERT4Rec

Traditional CBF VS Sequential CBF

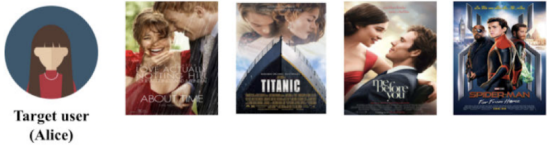
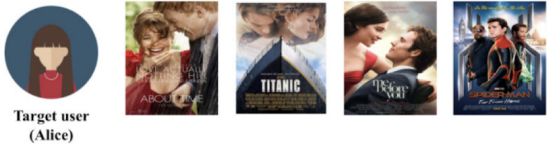


Figure 1: Example history for Alice in traditional CBF [1]

- models **general** user preference

Traditional CBF VS Sequential CBF



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- **BUT:** User preferences **change over time!** [2]

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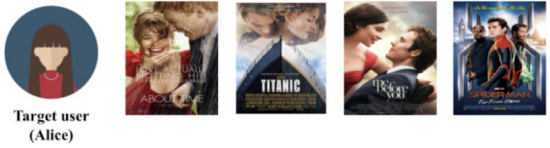

Figure 1: Example history for Alice in traditional CBF [1]

- models **general** user preference
- **BUT:** User preferences **change over time!** [2]

Figure 2: Example history for Alice in sequential CBF [1]

- Considers the **order** of historical interactions
- Allows the modelling of “temporary spikes” of interests, as well as the general preferences [2]

HybridBERT4Rec Architecture

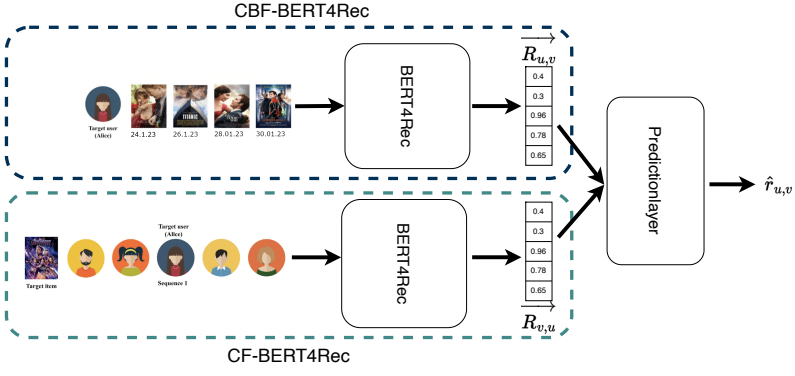

Figure 3: High level overview of HybridBERT4Recs Architecture. [1]

The Setting

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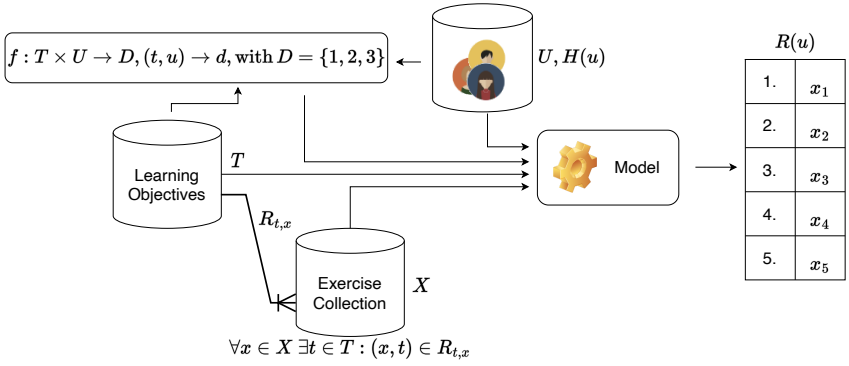

Figure 4: The Setting, consisting of a user collection U and their histories $h(u)$, a collection of learning objectives T and a collection of exercises X, which can be used to predict a ranking $R(u)$ for a given user u.

Model Adaption

CF-HybridBERT4Rec

- $u \in N \iff d_{u,t} = d_{u_m,t}$, with $U_m \in U, U \in U, t \in T$, N being the set of neighbors for target (masked) user u_m and learning objective t
- $\overrightarrow{R_{t,u}}$: a user-similarity probability distribution of all users over the target (masked) user

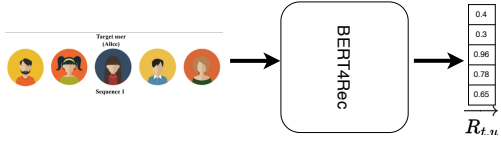

Figure 5: CF-HybridBERT4Rec architecture and input in the described setting

Evaluation

References

[1] Chanapa Channarong et al. “HybridBERT4Rec: A Hybrid (Content-Based Filtering and Collaborative Filtering) Recommender System Based on BERT”. In: *IEEE Access* 10 (2022), pp. 56193–56206. ISSN: 2169-3536. DOI: 10.1109/ACCESS.2022.3177610. (Visited on 11/02/2023).

[2] Shoujin Wang et al. “Sequential Recommender Systems: Challenges, Progress and Prospects”. In: (2019), pp. 6332–6338. (Visited on 11/02/2023).