Leave No One Behind: Fairness-Aware Cross-Domain Recommender Systems for Non-Overlapping Users

Weixin Chen* 1, Yuhan Zhao* 1, Li Chen 1, Weike Pan 2



¹ Hong Kong Baptist University ² Shenzhen University

0.060

Overall

Supervision Loss

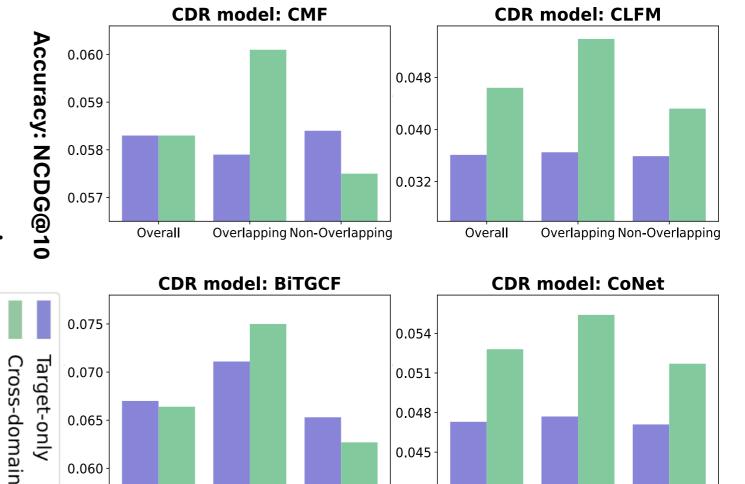
CDR model

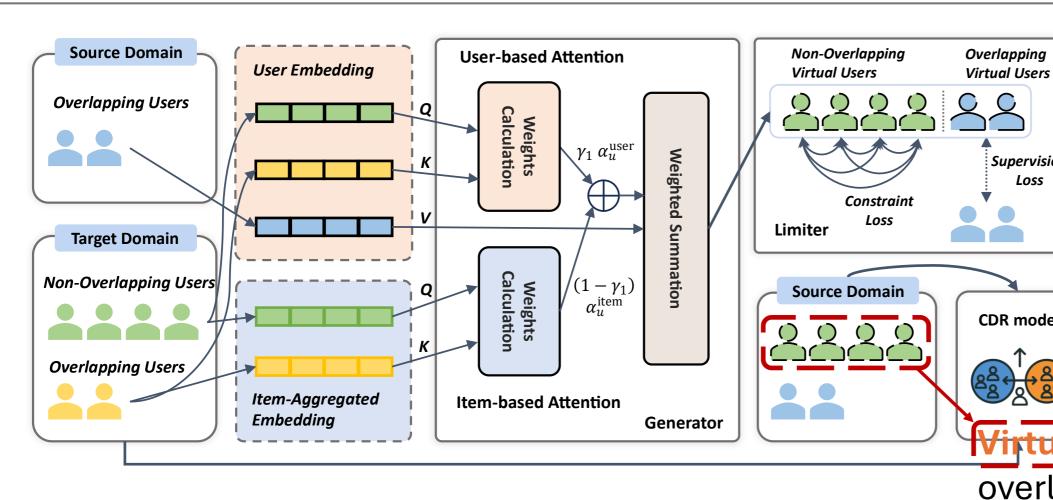


Research Problem: Unfairness in Cross-Domain Recommendation

- Cross-domain recommendation (CDR) leverages overlapping users to transfer knowledge from the source domain and improve target-domain performance.
- CDR overlapping bias: non-overlapping users see less improvement or even performance degradation compared to overlapping users.

This unfairness may erode user trust, and, consequently, negatively impact business engagement and revenue.





Unfairness on Amazon

Methodology

Overlapping Non-Overlapping

0.045

Key idea: generate the source embeddings for non-overlapping users in target domain, so they can also enjoy CDR learning:

Overall

Overlapping Non-Overlapping

$$\mathbf{e}_{\text{non}}^{S'} = \sum_{u \in \mathcal{U}^o} \alpha_u \left(\mathbf{W}_v \mathbf{e}_u^S + \mathbf{b}_v \right)$$

RQ3: Parameter Sensitivity

--- UGF (NDCG@10)

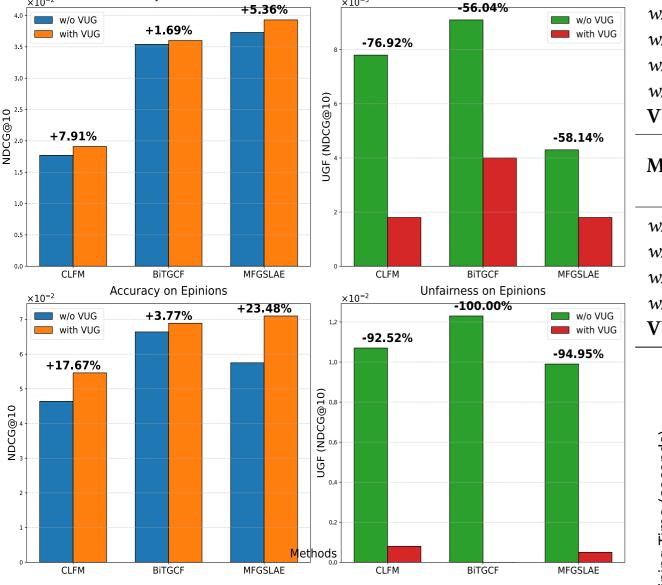
→ NDCG@10 --- UGF (NDCG@10)

tual source embeddings for nonoverlapping users in target domain

Experiments

Accuracy on Amazon

RQ1: Overall Performance

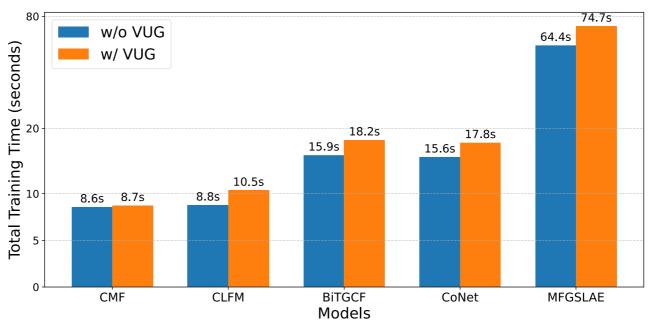


UGF measures absolute accuracy difference (e.g., NCDG@10) between overlapping and non-overlapping users.

RQ2: Ablation Study

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Method	Accuracy (larger is better)				Impact of γ_1 on Amazon NDCG@10	Impact of γ_1 on Epinions NDCG@10
	HR@10	HR@20	NDCG@10	NDCG@20	UGF (NDCG@10)	-D- UGF (NDCG@1
w/o $\mathcal{L}_{constrain}$	0.1302	0.1974	0.0655	0.0821		
w/o \mathcal{L}_{super}	0.1355	0.1985	0.0707	0.0864		
w/o α_u^{user}	0.1298	0.1974	0.0662	0.0828	A CONTRACTOR OF THE PARTY OF TH	
w/o $lpha_u^{item}$	0.1287	0.1963	0.0658	0.0824	and the second	The state of the s
VUG	0.1363	0.2001	0.0710	0.0865		
Method	UGF (smaller is better)				- γ ₁ Impact of γ ₂ on Amazon	Impact of γ_2 on Epinions
	HR@10	HR@20	NDCG@10	NDCG@20	NDCG@10 UGF (NDCG@10)	NDCG@10 -B- UGF (NDCG@1
w/o $\mathcal{L}_{constrain}$	0.0010	0.0168	0.0005	0.0033		\ \ \ .
w/o \mathcal{L}_{super}	0.0281	0.0152	0.0129	0.0096		
w/o α ^{usēr}	0.0020	0.0095	0.0015	0.0034	/	
w/o α_u^{item}	0.0041	0.0112	0.0005	0.0035		I god A poet
VUG	0.0003	0.0015	0.0005	0.0014		
RO1. Efficiency					γ ₂	Y2

RQ4: Efficiency



About me:

