

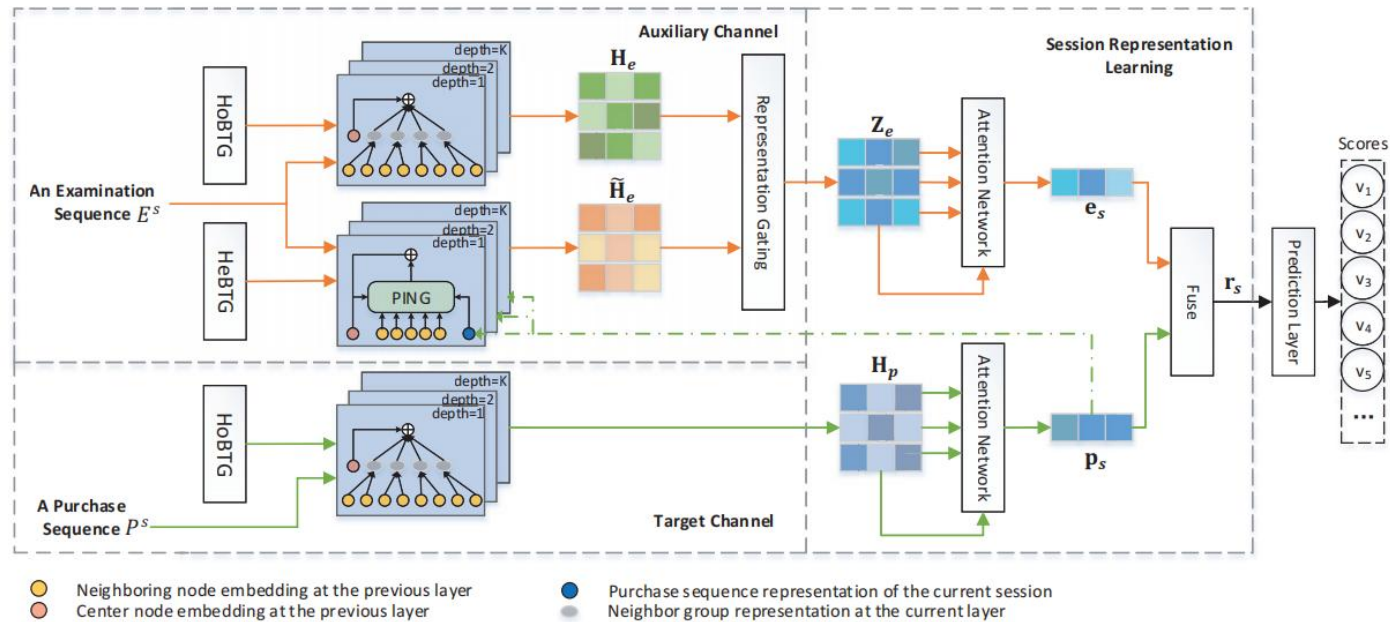
BGNN: Behavior-aware Graph Neural Network for Heterogeneous Session-based Recommendation

**Jinwei Luo, Mingkai HE,
Weike PAN, Zhong MING**

Frontiers of Computer Science, DOI: [10.1007/s11704-022-2100-y](https://doi.org/10.1007/s11704-022-2100-y)

Problems & Ideas

- Heterogeneous Session-based Recommendation (HSBR)
 - The heterogeneity and behavior transition challenges
- Ideas: A GNN-based model which models behavior transitions.
 - Construct two kinds of graphs to capture the homogeneous behavior transitions and heterogeneous behavior transitions
 - Design a personalized item neighbor aggregator and a representation gating module.



Main Contributions

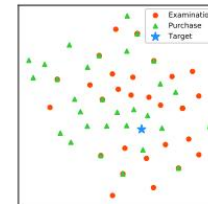
- Main Results

Method	Tmall			Yoochoose			User Behavior		
	H@20(%)	M@20(%)	N@20(%)	H@20(%)	M@20(%)	N@20(%)	H@20(%)	M@20(%)	N@20(%)
POP	0.917	0.462	0.560	0.708	0.139	0.266	1.508	1.263	1.314
ItemKNN	1.965	0.3393	0.682	8.748	2.374	3.767	2.309	0.5991	0.9626
GRU4Rec	2.429	0.698	1.071	12.616	2.925	5.019	2.828	1.414	1.718
NARM	2.541	0.736	1.124	12.110	2.806	4.808	3.591	1.518	1.967
STAMP	2.656	0.897	1.289	12.662	3.287	5.327	3.044	1.462	1.807
SR-GNN	2.998	1.045	1.482	12.959	3.588	5.6341	2.941	1.502	1.817
GCE-GNN	<u>6.453</u>	1.634	2.725	<u>18.376</u>	3.611	6.834	<u>5.829</u>	1.415	2.379
RIB	2.421	0.641	1.024	12.203	2.751	4.779	2.511	1.464	1.689
M-SR	3.419	1.171	1.669	11.485	3.399	5.169	4.708	1.462	2.168
DMT-trans	3.153	1.024	1.489	13.534	3.309	5.523	3.802	1.249	1.803
MGNN-SPred	5.701	1.789	2.655	14.417	3.406	5.79	5.206	1.775	2.517
MGNN-SPred-W	6.175	2.028	3.945	16.111	4.166	6.771	5.638	1.843	2.668
BGNN	8.691	2.918	4.205	19.167	5.267	8.322	8.952	2.913	4.235

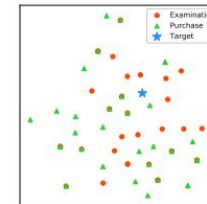
- Ablation Study

Architecture \ Dataset	Tmall	Yoochoose	UB
BGNN (w/o s&HeBTG)	6.175	16.111	5.638
BGNN (w/o s)	6.858	18.631	5.965
BGNN (w/o HeBTG)	8.368	17.974	8.799
BGNN (w/o PING)	8.428	18.977	8.823
BGNN (w/o RNG)	8.194	17.469	8.966
BGNN	8.691	19.167	8.952

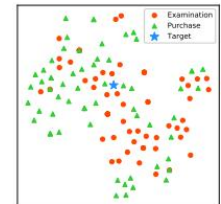
- Visualization



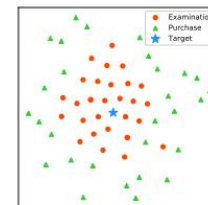
(a) Tmall(MGNN-SPred-W)



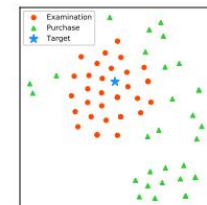
(b) Yoochoose(MGNN-SPred-W)



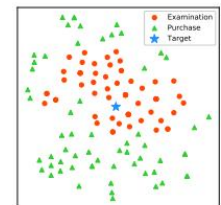
(c) UB(MGNN-SPred-W)



(d) Tmall(BGNN)



(e) Yoochoose(BGNN)



(f) UB(BGNN)