Non-Compensatory Psychological Models for Recommender Systems

ID: 335

September 4, 2019

Experiments

Rating Prediction Performance

Evaluation Metrics. The goal is to reconstruct the observed user-item ratings as accurate as possible. Hence we evaluate different approaches based on the following metrics. (1) AUC: (2) NDCG (3) RMSE (4) MAE (5) MRR

Table 1: Statistics of Datasets with ratings and implicit feedback

Dataset	#users	#items	#ratings	#sessions
Movielens	942	1650	80000	4641262
FilmTrust	1235	2062	35497	623516
CiaoDVD	2665	14280	72665	2478836

Table 2: Comparative rating prediction performance

Dataset	Method	AUC	NDCG	RMSE	MAE	MRR
Movielens	MF					
	MF-NCR					
	AMF	0.6043	0.5003	1.1682	0.9924	0.7506
	AMF-NCR	0.6129	0.5027	1.4392	1.2560	0.7559
	LLORMA		0.8990	0.9291	0.7322	0.5761
	LLORMA-NCR		0.8994	0.9217	0.7288	0.5761
Filmtrust	MF					
	MF-NCR					
	AMF	0.6244	0.5055	0.8601	0.7448	0.7622
	AMF-NCR	0.6436	0.5098	1.1535	0.9330	0.7717
	LLORMA		0.8672	0.8341	0.6437	0.6481
	LLORMA-NCR		0.8684	0.8310	0.6417	0.6533
CiaoDVD	MF					
	MF-NCR					
	AMF	0.6211	0.5048	1.2025	1.0261	0.7607
	AMF-NCR	0.7993	0.5657	1.1475	0.9723	0.8950
	LLORMA		0.7827	1.0436	0.8188	0.4883
	LLORMA-NCR		0.7838	1.0608	0.8271	0.4904

Ranking Performance for Implicit Feedback

Table 3: Comparative ranking prediction performance with implicit feedback—nonono

Dataset	Method	MAP	NDCG	Prec	Recall	MRR
Movielens	BTL	0.7654	0.5070	0.5307	0.7553	0.7654
	BTL-NCR	0.8440	0.5425	0.6879	0.8340	0.8440
	BPR	0.8478	0.5443	0.6956	0.8478	0.8478
	BPR-NCR	0.8623	0.5508	0.7246	0.8623	0.8623
	FSBPR	0.7474	0.4993	0.4968	0.7583	0.7484
	FSBPR-NCR	0.7964	0.5205	0.5908	0.7856	0.7954
	LCR					
	LCR-NCR					
Filmtrust	BTL	0.7674	0.5070	0.5307	0.7551	0.7654
	BTL-NCR	0.8182	0.5312	0.6379	0.8089	0.8190
	BPR	0.7825	0.5147	0.5649	0.7825	0.7825
	BPR-NCR	0.8365	0.5392	0.6730	0.8365	0.8365
	FSBPR	0.7484	0.4996	0.4980	0.7387	0.7490
	FSBPR-NCR	0.7956	0.5205	0.5908	0.7953	0.7954
	LCR					
	LCR-NCR					
CiaoDVD	BTL	0.8009	0.5230	0.6016	0.7903	0.8008
	BTL-NCR	0.9394	0.5857	0.8787	0.9291	0.9393
	BPR	0.7241	0.4883	0.4481	0.7240	0.7240
	BPR-NCR	0.9537	0.5922	0.9074	0.9537	0.9537
	FSBPR	0.7501	0.5001	0.5004	0.7401	0.7502
	FSBPR-NCR	0.8906	0.5637	0.7815	0.8806	0.8908
	LCR					
	LCR-NCR					

Table 4: Comparative ranking prediction performance

Dataset	Method	MAP	NDCG	Precision	AUC	MRR
Movielens	BTL	0.7654	0.5070	0.5307		0.7654
	BTL-NCR	0.8440	0.5425	0.6879		0.8440
	BPR	0.8478	0.5443	0.6956	0.7002	0.8478
	BPR-NCR	0.8623	0.5508	0.7246	0.7246	0.8623
	FSBPR	0.7474	0.4993	0.4968		0.7484
	FSBPR-NCR	0.7964	0.5205	0.5908		0.7954
	LCR					
	LCR-NCR					
Filmtrust	BTL	0.7674	0.5070	0.5307		0.7654
	BTL-NCR	0.8182	0.5312	0.6379		0.8190
	BPR	0.7825	0.5147	0.5649	0.7825	0.7825
	BPR-NCR	0.8365	0.5392	0.6730	0.6728	0.8365
	FSBPR	0.7484	0.4996	0.4980		0.7490
	FSBPR-NCR	0.7956	0.5205	0.5908		0.7954
	LCR					
	LCR-NCR					
CiaoDVD	BTL	0.8009	0.5230	0.6016		0.8008
	BTL-NCR	0.9394	0.5857	0.8787		0.9393
	BPR	0.7241	0.4883	0.4481	0.6380	0.7240
	BPR-NCR	0.9537	0.5922	0.9074	0.8982	0.9537
	FSBPR	0.7501	0.5001	0.5004		0.7502
	FSBPR-NCR	0.8906	0.5637	0.7815		0.8908
	LCR					
	LCR-NCR					

Table 5: Statistics of Datasets with graded sessional feedback

Dataset	#users	#items	#ratings	#sessions
Tmall-single	33815	176231	5682833	364844
Tmall-hybrid	62101	198344	6072061	475503
Yoochose	1	30852	3044572	341396

Table 6: Comparative ranking prediction performance with graded sessional feedback

Dataset	Method	MAP	NDCG	Prec	Recall	MRR
Tmall-single	BTL	0.4348	0.2814	0.2787	0.7253	0.4890
	BTL-NCR	0.4408	0.2853	0.2810	0.7308	0.4973
	BPR	0.4359	0.2826	0.2789	0.7252	0.4932
	BPR-NCR	0.4410	0.2854	0.2810	0.7305	0.4977
	FSBPR	0.4163	0.2732	0.2734	0.7092	0.4717
	FSBPR-NCR	0.4193	0.2747	0.2749	0.7130	0.4740
	LCR					
	LCR-NCR					
Tmall-hybrid	BTL	0.5015	0.3056	0.2934	0.7931	0.5458
	BTL-NCR	0.5592	0.3305	0.3044	0.8249	0.6063
	BPR	0.5463	0.3248	0.3006	0.8132	0.5950
	BPR-NCR	0.5635	0.3324	0.3050	0.8267	0.6112
	FSBPR	0.4398	0.2770	0.2768	0.7431	0.4817
	FSBPR-NCR	0.4597	0.2865	0.2831	0.7624	0.5007
	LCR					
	LCR-NCR					
Yoochoose	BTL	0.6368	0.4742	0.4569	0.8732	0.7156
	BTL-NCR	0.7112	0.5166	0.4786	0.8966	0.7882
	BPR	0.6821	0.5019	0.4711	0.8934	0.7639
	BPR-NCR	0.7049	0.5144	0.4775	0.9030	0.7844
	FSBPR	0.5685	0.4379	0.4374	0.8405	0.6541
	FSBPR-NCR	0.6825	0.5445	0.5362	0.8839	0.7987
	LCR					
	LCR-NCR					

Table 7: Comparative rating prediction performance

Dataset	Method	AUC	NDCG	RMSE	MAE	MRR
Movielens	MF-biased					
	MF-NCR-b					
Filmtrust	MF-biased					
	MF-NCR-b					
CiaoDVD	MF-biased					
	MF-NCR-b					

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Table 8: Scale of strength parameter θ

Method	Movielens	FilmTrust	CiaoDVD
MF-NCR	0.61 ± 0.11	0.67 ± 0.02	0.77 ± 0.05
AMF-NCR	1.62 ± 0.04	1.58 ± 0.13	1.68 ± 0.09
LLORMA-NCR			
BTL-NCR	1.57 ± 0.22	1.60 ± 0.34	1.37 ± 0.32
BPR-NCR	0.05 ± 0.0001	0.05 ± 0.001	0.15 ± 0.002
FSBPR-NCR	1.88 ± 0.14	1.89 ± 0.11	2.92 ± 0.54
LCR-NCR			
Method	Tmall-single	Tmall-hybrid	Yoochoose
BTL-NCR			
BPR-NCR			
FSBPR-NCR			
LCR-NCR			

Table 9: Scale of user-defined aspect-specific threshold $\mathbf{b}_{u,k}$

Method	Movielens	FilmTrust	CiaoDVD
$std(\mathbf{b}_{u,k})$			