

A Model Learning

Figure 1 plots the RMSE and MAE scores against the number of learning iterations for LRMM on datasets. The figure confirms the conclusion from Chai and Draxler (2014) that RMSE is more stable than MAE.

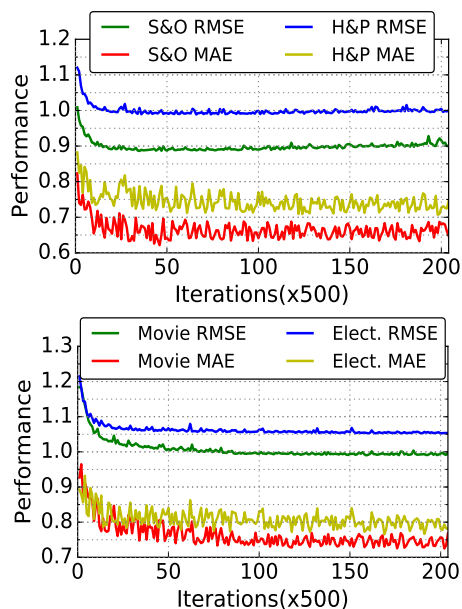


Figure 1: Changes of RMSE and MAE performance when number of iterations increases.

B Exemplary Rating Predictions

Table 1-4 present the randomly selected rating prediction examples on the test dataset for given user-item pairs. Table 1 and 2 give examples of test dataset of “S&O” and “H&P”. The models were trained with corresponding training datasets. Table 3 and 4 give examples of test dataset of “S&O” and “H&P”. But the models were trained with “Electronics” and “Movie” datasets. cross-domain adaptation strategy is utilized. The best prediction is in **blue** and the worst prediction is in **red** and symbols present:

- **T**: ground-truth rating score for a given user-item pair.
- **+F**: prediction with all modalities user review text (**U**), item review text (**O**), item metadata (**M**) and item image (**V**).
- **-U**: prediction with dropping user review text, this leads to *user-based cold-start* problem.
- **-O**: prediction with dropping item review text, this leads to *item-based cold-start* problem.

- **-M**: prediction with dropping item metadata.
- **-V**: prediction with dropping item image.

In Table 1-4, the users and items are presented with their corresponding user and item ID directly.

References

Tianfeng Chai and Roland R Draxler. 2014. Root mean square error (rmse) or mean absolute error (mae)?—arguments against avoiding rmse in the literature. *Geoscientific Model Development*, 7(3):1247–1250.

Table 1: Illustrative test examples of rating prediction on S&O dataset.

Item ID	User ID	T	+F	-U	-O	-M	-V
B00322FPDU	A2MIVOLAN127OW	5.0	4.64	4.553	4.168	4.498	4.616
B002P60ZZC	A25PA4XRMZMF0G	5.0	4.439	4.35	4.293	4.417	4.465
B000K5Y1XM	AC1W570QVFE9O	5.0	4.321	4.31	4.157	4.272	4.291
B001BS2C92	A2HMG925YHACE2	5.0	3.842	4.28	3.727	3.809	3.844
B0017WZQDQ	A3KRQVQAQ0BDHH	4.0	4.408	4.21	4.21	4.358	4.395
B000R9ACZC	A2A26KED39175E	1.0	3.772	4.345	3.52	3.657	3.647
B000NPVWPE	A33EMANJI78SGX	4.0	4.361	4.229	4.229	4.304	4.345
B003K7X5AC	A1EXGL6L0QQ0M5	5.0	4.292	4.243	4.149	4.218	4.278
B001949TKS	A02055972N4JENAU622IQ	3.0	3.835	4.408	3.679	3.877	3.888
B004LX3AXQ	A38KK0SZYEH5UD	5.0	4.639	4.555	4.288	4.578	4.6
B003PVGA1O	A371HASQDGDVV0	5.0	4.474	4.121	4.121	4.38	4.444
B004XUNDX4	A3N2DZA2PXRRC	5.0	4.935	4.526	4.526	4.919	4.861
B004DT6TEK	A3CD3GIXLTX3VI	5.0	4.056	4.433	3.801	4.01	4.055
B0006H3N4W	A3FIG40SDEVLO0	4.0	4.266	4.132	4.351	4.225	4.317
B0012RI01G	A1JZJFVE1K61LU	5.0	3.817	3.717	4.004	4.225	3.768
B001F4S0Y8	A3PZR1PPVVQC6C	5.0	3.778	3.665	4.267	4.225	3.758
B00AGB1JOO	A18T5PMU5CD6U2	5.0	4.714	4.457	4.457	4.705	4.743
B000O7HCK0	A67IRSANB1NRA	5.0	4.644	4.455	4.363	4.535	4.661
B0000VMX9U	AUPGEVBC9RV12	5.0	4.596	4.387	4.327	4.444	4.668
B00AVUJ26C	A1H97015EH4OZO	5.0	4.699	4.305	4.305	4.594	4.616
B001BR1LGI	A3SBOS17I5PNSH	5.0	3.897	3.818	4.159	4.594	3.884
B000N8LCDS	A2SAKKC6L8UJAT	5.0	4.706	4.242	4.242	4.598	4.677
B001MW31XS	A352L9PCDDK7NE	5.0	4.611	4.496	4.323	4.582	4.62
B0028KDC82	A2K78KQRZDQBIS	5.0	4.212	4.454	3.92	4.175	4.268
B001GE19VS	A24VLSBVOTBY85	5.0	4.334	4.386	4.092	4.295	4.357
B00162PQSW	A3Q5X21RROHQJY	5.0	4.355	4.483	4.074	4.296	4.358
B001BR2XH4	A1Z44EKDPMC51O	5.0	4.242	4.492	3.914	4.166	4.225
B0000CG813	A30EBGWO7F10BP	3.0	4.668	4.306	4.306	4.584	4.624
B00BPIGY6	A10IUD3B10K5HC	5.0	4.447	4.573	4.002	4.332	4.416
B000TG9RCC	AB2W04NI4OEA	5.0	4.406	4.322	4.259	4.361	4.433
B00004T69F	A10LVI0QQ1M7WR	2.0	3.603	4.227	3.458	3.488	3.616
B001SGZ17U	A3B40LMHFP8M3U	5.0	4.692	4.445	4.382	4.631	4.708
B004H9DO4Y	A1DA2DLNN6T0	4.0	4.561	4.347	4.308	4.452	4.508
B000P3WPKK	A1EE1HLYUIJPIG	5.0	4.53	4.42	4.261	4.477	4.472
B00278X0OQ	A3TI6V32Y7ZY14	5.0	4.225	4.368	4.026	4.136	4.192
B000H6P5IE	A56RDH3IBN7MU	3.0	3.974	4.342	3.821	3.943	3.983
B00BFCWA1E	A8OPMR1382E7P	3.0	3.964	4.388	3.737	3.874	3.977
B00LA12PNI	A1PI8VBCXXSGC7	5.0	4.464	4.348	4.197	4.32	4.494
B00005AM87	A21CR6QBS7CAFR	5.0	4.889	4.523	4.471	4.839	4.872
B004O6AHW	A33UO20BOT6TE9	3.0	3.946	4.081	4.098	3.96	4.012
B003BS2PW4	A29U0PFLZLFS0Z	5.0	4.413	4.459	4.07	4.357	4.338
B00DGAW3LA	A14ZSYKIW9VF66	5.0	4.471	4.373	4.258	4.394	4.521
B001IBIQ5Q	A2MBYDJV2VGHMO	2.0	4.157	4.45	3.823	4.025	4.147
B00FM9OBQS	A2WKEOZDXD9YUQ	5.0	4.243	4.448	3.944	4.214	4.284
7245456313	A8N56ELQ4JYID	5.0	4.589	4.44	4.331	4.592	4.647
B001C5ZPBG	A35C706TCG46ID	5.0	4.419	4.322	4.243	4.37	4.348
B0000C51OZ	A2DJ8N25WTJHGX	5.0	4.506	4.413	4.274	4.463	4.531
B000P1RO7Q	A1WWLPA4ONT88B	4.0	3.811	4.3	3.611	3.696	3.745
B00C2G58U2	A19Q4XTJXXC2ON	5.0	4.168	4.252	4.085	4.119	4.199
B0015R1NE4	A3L1RIEAPX26O2	4.0	4.223	4.309	4.051	4.169	4.227
B00814XFWU	A2MKWD9PM2BE6P	4.0	4.144	4.468	4.468	4.1	4.194
B007RKGAGY	AGNE7UKOB6BDZ	4.0	4.578	4.502	4.272	4.526	4.608
B00591F7M6	A3UX01P6UL6KIP	5.0	4.354	4.359	4.135	4.256	4.337
B0017KYWOW	A2UHA46FEVEVJ6	5.0	4.673	4.403	4.403	4.587	4.637
B000A8C5MS	AQC13YQ3J7V8E	5.0	4.467	4.382	4.217	4.328	4.45
B00I0HQ4MS	AWHZOUIQ0V07M	5.0	4.752	4.542	4.374	4.694	4.781
B0036N474S	ASTN4Q9E5IX9Y	5.0	4.397	4.469	4.097	4.318	4.377
B000NOQ3ZQ	A22RY8N8CNDNF3A	5.0	4.626	4.419	4.329	4.579	4.669
B005EMBEI6	A2D25FRJ25M06M	5.0	4.381	4.334	4.285	4.343	4.413
B0019GJZXW	ATZJNEXX7LWD3	4.0	3.668	4.296	3.534	3.679	3.759
B002QEDRIO	A1SN0B1U20G786	5.0	4.437	4.428	4.169	4.377	4.42
B0000C50HM	A1JJ1ZYNDNSX5P	5.0	4.56	4.352	4.352	4.544	4.574
B00162RM3E	A2HG37UWGBAD9H	5.0	4.496	4.488	4.176	4.422	4.465
B002E6R6B4	A3HQBKCYJF9FHZ	5.0	4.511	4.279	4.279	4.405	4.425
B002RO1E70	AXFSJQBII1FLZW	5.0	4.755	4.572	4.426	4.702	4.764
B000IXG44U	A1S4UBWYVC7FKW	5.0	4.695	4.503	4.455	4.7	4.801
B00162QGLS	A1LUD1K042KCO	4.0	4.013	4.446	4.446	3.814	3.919
B001UERXOQ	A171L9DKOSZ8S1	4.0	4.329	4.329	4.145	4.245	4.296
B001HBHNM4	AT3P5KJQPK8H3	3.0	4.171	4.232	4.093	4.102	4.194
B000FXZV4W	A1JS5THY0EH2PS	5.0	4.332	4.256	4.202	4.241	4.341

Table 2: Illustrative test examples of rating prediction on H&P dataset.

Item ID	User ID	T	+F	-U	-O	-M	-V
B0037KMI0U	A20MMOYFA8BTNR	5.0	4.466	4.338	3.992	4.458	4.391
B000052XB5	A171XR563SZDLR	1.0	2.211	3.94	3.94	2.09	2.055
B00068JBIS	A2ILV6IPPW6W7I	2.0	3.912	3.749	3.978	3.841	3.859
B0038B3AGO	A2VK5UG43AV30U	5.0	4.314	4.044	4.044	4.346	4.33
B008R5W15M	A3NM1MT3Q2FHXX	4.0	3.293	3.245	3.859	4.346	3.271
B0058A9HLK	A1KHFO37SJWIRR	5.0	4.678	4.249	4.249	4.64	4.66
B001A0C7E6	A1UM2Y9A9TCJXU	5.0	4.64	4.217	4.217	4.724	4.746
B00CWNMR5Y	ARTA78TP6H73D	5.0	4.64	4.366	4.183	4.678	4.672
B00336EUUE	A33TRNCQK4IU07	3.0	3.496	3.318	4.209	3.51	3.589
B005FTK7F4	A28TF49GADWWR9	4.0	3.615	4.067	3.441	3.607	3.608
B004H7GB9G	AJBLCBYL4V8X	5.0	4.928	4.153	4.153	4.853	4.84
B007RVX9YO	A3H6H5TOAVHN30	5.0	4.416	4.222	4.006	4.403	4.417
B004N8TTBQ	AR64P9P1IOZA6	5.0	4.775	4.273	4.273	4.838	4.804
B00G7PCKI2	A105S56ODHGJEK	5.0	4.344	4.267	3.825	4.249	4.275
B001OOLLVS	A2HS7K379UG0G5	5.0	4.475	4.161	4.161	4.463	4.474
B001TLU5S6	A168UTC2EFSGQL	5.0	4.162	3.559	4.509	4.184	4.197
B000668QYU	A1SAZB83QFR0W2	5.0	4.561	4.239	4.208	4.567	4.634
B004L4AMIQ	A1L3XMZBKMU6QG	3.0	3.858	3.698	4.261	3.971	3.956
B0013OSO0K	A1UOAA1QWBFETG	5.0	4.567	4.245	4.184	4.559	4.536
B001RYEETQ	AT96TYI24GKXH	3.0	2.023	3.255	2.748	1.983	1.964
B0058AARI2	A309A7B0KJO88B	3.0	2.878	3.443	3.443	3.086	2.87
B0013OUJPS	AQLL2R1PPR46X	3.0	4.226	4.258	3.977	3.086	4.245
B005ACNPLO	A2N9Y04UFXIN8B	4.0	4.192	3.711	4.343	4.14	4.106
B003ZYM5NI	A2CNGARED6OWWU	1.0	3.53	3.495	3.808	3.555	3.498
B007762NQE	A2KJ9CEH371YUN	5.0	4.028	3.73	4.247	4.104	4.048
B00288UESA	ATHQP2NQRWWDA	5.0	4.768	4.106	4.106	4.836	4.848
B0033WT4ZO	AX5E1Q0LNL0HG	4.0	4.388	4.408	3.992	4.836	4.405
B00JZR9SE	A537XC69FAD3J	5.0	4.912	4.351	4.351	4.929	4.919
B0072DAZEE	A11OTLEDSW8ZXD	4.0	3.897	3.748	3.985	3.891	3.827
B007DKVI4C	A3UW0PQLDUACMH	4.0	3.617	3.037	3.037	3.666	3.699
B001F51VS4	A1B05INWIDZ74O	3.0	4.501	4.21	4.181	4.49	4.467
B0087TNBUC	A134C9GVEU5TQE	2.0	1.46	1.11	2.537	4.49	1.422
B00AW6YQVQ	A1VKAY0XWLA2CY	2.0	2.718	2.238	4.36	2.914	2.813
B001G7QG72	AX1TLM9RLP72L	5.0	4.683	4.052	4.052	4.68	4.662
B0047FPM16	A3JB405VRAERCS	4.0	4.253	4.281	3.849	4.68	4.26
B00DCAJ6TG	A11J1FHCK5U06J	4.0	5.036	4.347	4.347	4.972	5.111
B001BJHCVO	ALVYD6HBLYI0W	4.0	3.506	3.409	4.005	3.449	3.466
B002YD8GBG	A22I55P15NSAOX	5.0	4.552	4.54	3.894	4.514	4.498
B003LBYB3M	AGX0QBT90WAC6	2.0	4.372	4.335	3.898	4.283	4.317
B00CHI16K6	A21OBYW0N5ENS7	4.0	4.332	3.877	3.877	4.288	4.315
B00FZHUGVQ	A34GM17T6WTJDK	5.0	4.063	3.912	3.912	4.018	4.057
B00020I9II	ABTUKJSZV4STB	4.0	4.505	4.611	4.214	4.018	4.595
B005QEP6TK	A1S7VZIS6VUWD7	5.0	4.441	3.92	3.92	4.409	4.38
B00185OLEW	A2APTUY7J8CN29	5.0	4.782	4.079	4.079	4.798	4.782
B0077EA8DQ	A2CKI7D9CTDZYR	4.0	3.3	3.027	4.077	3.193	3.269
B000HA8M4E	A35SJXBGJG948J	5.0	4.643	4.364	4.183	4.64	4.566
B0006U6IMI	A2A38CL5LF29VX	4.0	4.411	3.84	3.84	4.408	4.454
B000BNWN56	A3TAS1AG6FMBQW	5.0	4.812	4.295	4.295	4.912	4.903
B000FRIWUS	AT9SMMJFVZOKW	5.0	4.851	4.34	4.34	4.945	4.976
B008KEHA2E	A25C2M3QF9G7OQ	4.0	4.236	4.299	3.87	4.945	4.245
B00006L9CA	A1115ST6F5CWYP	5.0	4.171	3.827	4.294	4.166	4.14
B00014EWUO	A2JK2F69GDATO0	5.0	4.7	4.322	4.322	4.754	4.776
B004WPJBDG	A37FFWZUGO8L7W	4.0	4.375	4.083	4.083	4.446	4.459
B0038NB8M0	A1OATQG6MDSMID	1.0	2.587	4.207	2.379	2.493	2.592
B0085YJ4IO	AO96PLO6E3MJC	4.0	4.016	3.852	3.852	4.03	4.071
B005G4YCHW	A2S1E1WRYIVT7R	5.0	5.217	4.53	4.53	5.313	5.299
B000JH3MU	A21VZDJXHITESS	5.0	4.698	4.313	4.265	4.779	4.729
B00HBBX4EA	AS44QEHT3KSPK	5.0	4.532	4.287	4.109	4.468	4.507
B003WJD8HI	A3CG93783LP0FO	4.0	3.975	4.05	3.79	3.968	3.921
B004NSUMTO	AR1T36GLLAFFX	4.0	4.36	4.404	3.987	3.968	4.323
B004Y9AINC	A1WVM25ZPNU32A	4.0	3.559	3.406	4.116	3.541	3.586
B004U3Y9FU	A34ATWL87P8HDL	5.0	4.297	4.403	3.845	4.332	4.294
B00FT8ZHHE	A21ZE48YPVAE4A	5.0	4.825	4.15	4.15	4.897	4.913
B000GG15YS	A1FF092PR1359L	3.0	3.496	4.471	2.884	3.333	3.339
B000GCED9G	A11F60W72FUBH8	5.0	4.471	3.968	3.968	4.382	4.468
B000KBNPQ0	A25QXWTEABEZ4R	5.0	4.683	4.072	4.072	4.634	4.638
B0014XHC6M	AM6O8240VDHZ5	4.0	2.96	2.857	3.726	4.634	3.006
B0070252GI	A2AF9PR2RWX5H1	5.0	4.572	4.307	4.195	4.613	4.581
B006L10EJO	AF0E5TGS52NRD	5.0	4.327	4.369	3.961	4.334	4.334
B0007A2E0W	A36JO8IHKYBMMJ	3.0	4.169	4.18	3.903	4.001	4.136

Table 3: Illustrative test examples of rating prediction on S&O dataset in cross domain adaptation. The pre-trained model is based on Electronics dataset.

Item ID	User ID	T	+F	-U	-O	-M	-V
B0017X3EKM	ACJN23C0Y1GGU	3.0	4.474	4.298	4.197	4.406	4.39
B000KDM3BG	A13SV7V95KQBXQ	5.0	4.512	4.176	4.176	4.606	4.61
B001P4FNCU	A11X5OHQLEY7L	5.0	5.028	4.666	4.525	5.148	5.097
B009LOSCLM	A2FICQ6IEJFK9D	3.0	4.155	3.72	4.401	4.236	4.13
B001R67OBE	A12R3YGEHW7D8G	5.0	3.435	3.414	3.754	4.236	3.421
B007TRGZ7Y	A3QQZO3PJ41GZG	4.0	3.262	4.236	3.144	3.365	3.187
B000N5UV4C	A2TZD7OY7A7XUA	3.0	4.2	4.479	3.67	4.241	4.158
B006J64XBQ	A163KRCXD2S2BV	5.0	2.894	2.883	4.069	3.873	2.905
B001HBNHNE	A3N2DZA2PXRRXC	5.0	4.453	4.008	4.008	4.467	4.474
B002OAU30G	A2BOL8LPXCPWKV	4.0	5.211	5.215	4.602	4.467	5.13
B0042FJH5S	A1FIJV02FOE0FR	5.0	4.518	4.511	4.105	4.56	4.456
B000FICBEU	A1FZAZE34727U5	4.0	4.404	4.301	4.174	4.434	4.455
B0014VTRF8	A3QKUOHGH6SUNB	4.0	4.488	4.364	4.1	4.478	4.405
B008CI7QTU	A3CCJKIO1ZIVAO	5.0	4.177	4.11	4.068	4.111	4.094
B0015RDJZK	A2BYV7S1QP2YIG	3.0	4.675	4.374	4.214	4.681	4.752
B001B7ZB4Q	A2872HUELOYZW8	3.0	4.088	4.214	3.992	4.17	4.137
B00363WYWU	A3ASLNUBSSOOL	4.0	4.214	4.304	3.932	4.17	4.215
B006082JYW	A25C2M3QF9G7OQ	3.0	3.827	4.165	3.737	3.784	3.789
B001AX6MMG	A17TGD0FLF5U89	5.0	3.39	4.093	3.32	3.44	3.322
B004FOV89E	A2NLMNMG5AT2JR	5.0	4.412	4.456	4.057	4.332	4.362
B00C586H3E	A13YGY4FR9XN3	4.0	4.722	4.75	4.305	4.332	4.68
B000ELSSZE	A31CCYZHA9LA0M	4.0	4.242	4.427	4.427	4.221	4.275
B00CPCHBCQ	A11E9KUJDWNPD2	5.0	4.08	4.135	3.947	4.128	4.071
B001T7QJ9O	A1NT4YYYVBMS2EE	4.0	4.742	4.835	4.235	4.128	4.737
B000FU4HTA	APTLIEGQJ7M8D	5.0	4.562	4.207	4.207	4.501	4.515
B004GYIE5E	A3GG3DJH47CTZ5	5.0	4.414	4.451	3.963	4.366	4.355
B000F7P292	AYHHDGOBNKHDE	3.0	4.419	4.132	4.132	4.441	4.448
B0035KW3WU	A35PG2QRIZB4TS	5.0	4.971	4.525	4.358	4.906	5.008
B00C5RO28M	A34JMO83CXVDLV	5.0	4.456	4.369	4.099	4.419	4.429
B0013ASG3E	A1WEDIT6PNQO12	5.0	4.492	4.265	4.168	4.588	4.428
B005BJU3NE	AL8KY5MD92YE0	4.0	4.15	4.299	3.959	4.155	4.233
B0007ZF4Q8	ABKUJX7YJZ3DA	5.0	4.651	4.488	4.15	4.654	4.578
B002HOFBQU	AAWDMELHNPBL4	4.0	4.258	3.978	3.978	4.159	4.16
B00069PPC8	A1WCA4LG7UOZHF	3.0	4.65	4.434	4.225	4.694	4.726
B006OU4E4S	A1BI06MVLKB3WC	5.0	4.303	4.39	4.003	4.326	4.314
B000UGYWTO	A4SYLZT0PGE96	5.0	4.497	4.271	4.271	4.549	4.407
B004TDPGSU	A2PSTWYS4P4LQZ	3.0	4.148	4.038	4.038	4.121	4.155
B008H7PSUA	A2LDUY2YY28NVG	4.0	4.089	4.401	4.401	3.883	3.971
B00794VUJ0	AFNYEP9UND180	3.0	3.572	4.078	4.078	3.585	3.596
B00266AHQ8	A3ENST25GT2KH	5.0	4.871	4.592	4.465	4.84	4.952
B00165Q944	AA808VC64TIWC	4.0	3.439	4.077	3.272	3.426	3.334
B000BO4O5M	A1GSJN6HE8W884	5.0	3.783	4.125	4.125	3.83	3.818
B00AAGLS8W	A8OHK6XIOV9HL	4.0	3.784	4.101	3.699	3.878	3.862
B002I02HQU	A176Y7DNY6H2DN	4.0	3.965	3.893	3.993	3.906	3.937
B0055NW8FW	AY2MBJ5FRSZAN	4.0	4.244	4.389	3.891	4.187	4.226
B000M0MJU2	ALESZTNX7XZC	5.0	4.012	4.191	3.976	3.989	4.0
B004K1D9NA	A2TI79NM4NCEUI	4.0	4.525	4.564	4.193	3.989	4.5
B000AQABOY	A2Q9ORIBPMCZ40	5.0	4.546	4.188	4.188	4.569	4.475
B001UFU9T6	A2HY1IGOK2MX5G	5.0	4.623	4.575	4.07	4.6	4.561
B004C94X12	A16NBGAUIYS16	1.0	3.864	4.361	3.589	3.942	3.916
B0074FI28Q	AX1XAET3GDV0P	5.0	4.727	4.414	4.414	4.868	4.734
B001DCB61Q	A3DLSQMJRNDQKA	5.0	4.658	4.296	4.296	4.647	4.706
B00168K3IY	A3P09N99T4VIXZ	5.0	3.938	4.151	3.749	3.897	3.907
B000F7VV56	AGDH4IDGDNPTZ	2.0	3.804	4.173	3.527	3.808	3.702
B008KS4DGQ	A15KLG5DK0BZHG	4.0	4.389	4.444	3.945	3.808	4.387
B004HIFS26	A2QGCMZ0K7XMC	5.0	4.444	4.191	4.191	4.427	4.431
B00100748Q	A4XA34LFWC07K	4.0	4.52	4.055	4.055	4.507	4.511
B000A8BSK8	A2N5YHZS9HHOOL	3.0	2.909	4.045	4.045	2.982	2.962
B0013E5N5E	A276Z3OL222ECU	4.0	4.513	4.147	4.147	4.508	4.499
B002HSSJIS	A3G34L1Q2WWHPR	4.0	3.897	4.499	3.454	4.048	3.991
B000VT2HKQ	A3MR3BPIY2YNEJ	5.0	3.712	4.158	4.158	3.787	3.703
B000093ILT	A3R90LTE5PFBLO	4.0	3.788	4.145	3.673	3.79	3.701
B000ASB66E	A13YSL2NNQHVSC	5.0	4.946	4.573	4.406	4.931	4.947
B0030H59PG	A38DKP5LURJEIR	2.0	4.003	4.506	3.647	3.954	3.958
B002E6X44C	A2T0DCJT1DSMGZ	3.0	4.363	4.271	4.087	4.318	4.284
7245456313	APS831ZLF95PS	4.0	4.265	4.063	4.063	4.253	4.262
B001BR4R6E	AFXXS6KIJ9E83	4.0	4.964	4.524	4.219	4.922	4.868
B005ZEND7I	A12B0EANN581RD	5.0	3.939	3.867	3.984	4.922	3.98
B002TUSK06	A98EMXHC6883S	5.0	4.291	4.449	3.865	4.301	4.278

Table 4: Illustrative test examples of rating prediction on H&P dataset in cross domain adaptation. The pre-trained model is based on Movie dataset.

Item ID	User ID	T	+F	-U	-O	-M	-V
B00ARF450E	A1J75JJ0Q2OEJN	4.0	4.724	4.741	3.723	4.557	4.653
B003XUAECI	A20VQ9HLIW3HUO	4.0	4.125	4.368	3.333	4.221	4.159
B000P9S2K6	AL6CEWLV2JB90	5.0	4.371	4.227	3.474	4.308	4.319
B002GKEK7G	A1YDBR30Y6W22I	5.0	4.716	4.333	3.974	4.776	4.761
B003UKKHB4	A21FO8HXJECL08	4.0	4.162	4.087	3.585	4.194	4.182
B000KUHF6GM	AEAIQ13BB832K	5.0	4.722	4.308	3.828	4.697	4.698
B002P6CIKW	A330NPBZJ8EMSH	5.0	4.322	4.098	3.631	4.371	4.275
B000PKMA2G	AQMDSDO10OJN5	3.0	3.848	3.929	3.47	3.871	3.836
B000QV9YXW	A3Q5QDQMB4XCBN	4.0	4.911	4.398	4.054	4.904	4.891
B001HLI6QQ	A2RQEMHGSSS78G	5.0	3.026	2.925	3.346	4.904	2.974
B008R5XS22	A12N6NOSNG07VD	5.0	4.369	4.4	3.494	4.319	4.405
B000X9P5GM	A18B503XYGLK9T	3.0	4.089	4.059	3.504	4.083	4.077
B001F51VS4	A8KJS2P6E5DCB	4.0	4.448	4.431	3.481	4.461	4.349
B00DBTQJO8	A301B6L3TCD7WL	4.0	4.123	4.195	3.438	4.202	4.18
B00122JDYU	A94KNPWW8SL2	5.0	3.855	4.039	3.24	3.797	3.809
B001BJLGZC	A1WYSC85NLM4Z	3.0	4.127	4.163	3.434	3.797	4.148
B004FPTQCO	A1IC75BCAGQ4IK	5.0	3.85	4.444	2.925	3.888	3.849
B004CQ44WI	ALNAXN9SFT7BB	5.0	4.482	4.39	3.65	4.559	4.533
B000BY6B3K	A2TRMJA5NJS5TW	3.0	4.604	4.297	3.843	4.595	4.564
B001IHAPI6	A2QW4HHHC6XWH4	5.0	4.416	4.304	3.538	4.376	4.436
B00008BFXL	A9EABIKT2J4JA	5.0	4.276	4.072	3.696	4.303	4.294
B007571RDK	A10T29TL9SO25O	4.0	4.573	4.229	3.793	4.525	4.507
B00940DV6W	AC61U16AJQ8X7	3.0	4.455	4.505	3.625	4.525	4.499
B001G7QJPG	A2DH08YJYIBSB7	5.0	4.181	3.989	3.689	4.224	4.228
B00361ETCK	A1T1YSCDW0PD25	3.0	3.558	3.241	3.703	3.436	3.477
B0019LPCNO	ADU6LGFXXO4XF	3.0	4.327	4.198	3.65	4.307	4.29
B002YX0OQG	A1NSJHH59U8EKD	5.0	4.063	4.013	3.536	4.012	4.011
B0018US55G	A3HXJITAB9QGKV	5.0	4.628	4.364	3.729	4.668	4.679
B001BOISNU	AOEUK9GPJKFGN	5.0	4.696	4.439	3.768	4.731	4.694
B000270OY8	A2ZE5Y9BV188XV	5.0	4.3	4.014	3.755	4.283	4.293
B000HF29KM	A34AK2G3DMQ6T3	4.0	3.829	3.952	3.284	3.774	3.795
B001BYBHHE	A38G6AFVNYG9NX	5.0	4.18	4.356	3.283	4.255	4.168
B008RY42HS	A30SQ028COI38D	4.0	4.111	4.308	3.273	4.116	4.13
B00DOSAN7A	A3ATKIUM6ZZ4MU	4.0	4.148	4.048	3.615	4.148	4.159
B000QS2ZFY	A24OF9JEF18P12	5.0	4.142	3.85	3.677	4.061	4.102
B009810D4S	A20MEQGP5HGMX5	3.0	4.266	4.203	3.577	4.253	4.296
B00CUG26Z4	A2Q6WLEPFAU4PI	5.0	4.167	4.406	3.205	4.168	4.098
B0013OULFQ	A2W9I628I6SE1U	4.0	4.113	4.329	3.312	4.098	4.112
B0032TNPOE	A394HK1TR2GV9P	5.0	4.549	3.926	3.926	4.506	4.454
B00940DUFY	A13EW5BAP1LSFQ	4.0	4.073	4.174	3.351	4.012	4.02
B001G7QUXW	A16W8BRJHOVUOS	4.0	4.624	4.124	4.124	4.594	4.553
B0030NWZUC	A1DH3QDZX8Z7GO	3.0	4.114	4.203	3.392	4.134	4.149
B0026HDURA	A16DWTOM2OU4J8	4.0	4.188	4.211	3.453	4.144	4.195
B00GY61I2S	A3I38VP7ZNCCKM9	5.0	4.63	4.264	3.818	4.602	4.547
B000V72992	A11YIHB6IW352W	4.0	4.762	4.261	3.875	4.719	4.728
B0054RZS4M	A2IDX4HG0LESW7	5.0	4.548	4.304	3.714	4.58	4.526
B000FEIOCM	AS1KPP03BS7OG	1.0	2.292	3.286	3.286	2.309	2.274
B0001KFXCO	A1CEUAFLF24FHQ	5.0	4.113	3.794	3.761	4.164	4.12
B0098QW8F2	A24AOGQH7N9G20	3.0	4.313	4.136	3.619	4.254	4.257
B000GP3FME	ATJN4KEHJBOC8	4.0	4.574	4.361	4.361	4.52	4.444
B007XVF3AQ	A1AC1ZXX9IBCTT	5.0	4.192	4.333	3.353	4.185	4.205
B0002CZYRA	AMA9XZWT5SIRMJ	3.0	4.095	4.111	3.603	4.185	4.069
B000668QYU	A2PCJ19IEGIDAP	2.0	3.491	3.936	2.998	3.452	3.447
B001G7QGCM	A1B6TLJKZ5EX6F	5.0	4.277	4.161	3.556	4.252	4.189
B000GLPPLM	A1Z2PH9Y1E50NE	3.0	3.818	4.01	3.327	3.867	3.81
B00HKNQQTZU	A37R3P5JFNQG8S	4.0	4.109	4.179	3.386	4.127	4.086
B004JOS33I	A3M6VY2USEFFTI	3.0	4.409	4.279	3.514	4.398	4.338
B000UK2VRK	A3M174IC0VXOS2	4.0	4.733	4.505	3.623	4.731	4.727
B0042M896E	A6WHM5MMRGS4	4.0	4.364	4.071	4.071	4.277	4.364
B0013OX9NC	AEWYUPCNDV7HY	5.0	4.163	4.228	3.438	4.191	4.151
B000VBNSS4	A2R8HEMHC8E334	5.0	3.901	3.742	3.693	3.863	3.968
B002NWHOXY	AD2QRU9ZXBQZ1	2.0	4.696	4.744	3.742	3.863	4.699
B000VTC3Q4	A3M6L86GPYG0A9	5.0	4.617	4.165	3.947	4.679	4.66
B00009ZY40	A3OXHLG6DIBRW8	4.0	3.299	3.821	2.943	3.301	3.306
B000H8VPNG	A2582KMXLK2P06	3.0	3.67	3.959	3.197	3.633	3.615
B0029IPMMM	A2KW2LCO5QUWOI	4.0	4.192	4.185	3.485	4.14	4.151
B001M5AE12	A2Z9X06PCY3U85	5.0	4.035	4.328	3.212	4.04	4.006
B0002DMPEY	A1IUEKFZUT7PDL	5.0	4.264	4.191	3.551	4.236	4.317
B00BZC43G4	A2QRXQPHDMFCQV	4.0	4.501	4.219	3.802	4.43	4.484