



**University of the Peloponnese**  
**Department of Informatics and Telecommunications**  
**Software and Database Systems Laboratory**  
<https://soda.dit.uop.gr>

## **Experimental results for Evaluating User Similarity Metrics in Sparse Collaborative Filtering Datasets**

Technical Report TR-24001

Kiriakos Sgardelis, Dionisis Margaritis, Dimitris Spiliotopoulos  
Costas Vassilakis

[k.sgardelis@go.uop.gr](mailto:k.sgardelis@go.uop.gr), [margaris@di.uoa.gr](mailto:margaris@di.uoa.gr), [dspilot@uop.gr](mailto:dspilot@uop.gr),  
[costas@uop.gr](mailto:costas@uop.gr)

March, 2024  
Tripoli, Greece

# 1. Introduction

In this technical report, we present the experimental findings from evaluating 15 user similarity metrics when applied in sparse collaborative filtering (CF) datasets.

The 15 user similarity metrics evaluated in our work are the following [1-4]:

1. The Jaccard Index (JACC)
2. The Manhattan distance (MANH)
3. The Euclidean distance (EUCL)
4. The Chebyshev distance (CHEB)
5. The Pearson Correlation Coefficient (PCC)
6. The Constrained PCC (CPCC)
7. The Sigmoid Pearson Correlation Coefficient (SPCC)
8. The Cosine similarity (COS)
9. The Adjusted Cosine measure (ACOS)
10. The Spearman rank correlation (SP)
11. The Kendall's Tau correlation (TAU)
12. The mean square difference-based similarity (MSD)
13. The Normalized Sum of Multiplications (NSM)
14. The Adjusted Rand index (ARI)
15. The Adjusted Mutual Information (AMI)

For the NNs selection we use the following two methods:

1. the KNNs: where we use only the K NNs with the higher similarities with the active user [5] (in our experiments we have 2 settings: K=250 and K=500).
2. the similarity threshold: where we use only the NNs whose similarities, with the active user, exceed a specific threshold THR [6] (in our experiments we have 3 settings: THR=0.0, THR=0.25 and THR=0.5), and

For the rating prediction numeric value production, we use two formulas:

1. the weighted sum function [7], and
2. the mean-centered prediction function [8].

## 2. Experiment results

In this section, we report on our experiments aiming to find the most effective user similarity metrics in sparse CF datasets, in terms of prediction accuracy (primarily) and prediction coverage. Regarding prediction accuracy, we use 3 metrics, the MAE, the RMSE and the F1-measure (which includes the precision and recall metrics). As far as the rating prediction process is concerned, we exercise the standard 10-fold cross validation (and merge the ten rating prediction results).

The datasets used in the experiment are summarized in Table 1, and the results obtained are listed in the following subsections.

TABLE 1. DATASETS AND THEIR SPARSITY

Name	Sparsity %
R4 - Yahoo! Movies [9]	99.76
Book-crossing [10]	99.99
Amazon Video_Games [11]	99.95
Amazon Cell_Phones_and_Accessories [11]	99.985
Amazon Movies_and_TV [11]	99.98
Amazon Kindle_Store [11]	99.98
Amazon Digital_Music [11]	99.93
Amazon Musical_Instruments [11]	99.93
Epinions [12]	99.99
CiaoDVD [13]	99.91

It has to be mentioned that the rating range of all datasets are [1-5], except for the Book-crossing which is [0,10].

### 2.1 Performance evaluation

In the following subsections, we present the detailed rating prediction results, in 2 parts, the first for the similarity threshold NNs selection and the second for the KNN NNs selection.

### 2.1.1 Experiments using the KNNs neighbor selection with the weighted sum prediction function

Table 2 depicts the prediction MAE results when K=250 and the weighted sum function is used.

TABLE 2. MAE RESULTS WHEN K=250 AND THE WEIGHTED SUM FUNCTION IS USED

MAE (K=250 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	0.247	0.672	0.557	0.407	0.608	0.468	0.825	0.874	3.002	0.792
MANH	0.251	0.685	0.622	0.439	0.658	0.504	0.822	0.892	3.087	0.756
EUCL	0.251	0.683	0.622	0.438	0.657	0.504	0.82	0.891	3.087	0.757
CHEB	0.251	0.682	0.622	0.436	0.657	0.504	0.82	0.889	3.103	0.758
PCC	0.273	0.705	0.63	0.451	0.64	0.5	0.879	0.928	3.101	0.794
CPCC	0.248	0.663	0.623	0.429	0.633	0.494	0.826	0.89	2.869	0.77
SPCC	0.271	0.698	0.61	0.44	0.631	0.498	0.887	0.912	2.947	0.77
COS	0.251	0.68	0.636	0.43	0.655	0.503	0.826	0.897	3.575	0.789
ACOS	0.261	0.686	0.622	0.45	0.606	0.473	0.86	0.933	2.859	0.753
SP	0.219	0.647	0.603	0.409	0.535	0.434	0.85	0.942	2.827	0.789
TAU	0.25	0.692	0.676	0.447	0.647	0.5	0.853	0.919	3.32	0.824
MSD	0.25	0.668	0.618	0.428	0.647	0.498	0.823	0.876	3.032	0.748
NSM	0.251	0.672	0.621	0.429	0.654	0.501	0.823	0.88	3.549	0.753
ARI	0.228	0.657	0.597	0.412	0.504	0.388	0.909	0.938	3.173	0.818
AMI	0.246	0.694	0.673	0.441	0.635	0.486	0.839	0.919	3.098	0.826

Table 3 depicts the prediction RMSE results when K=250 and the weighted sum function is used.

TABLE 3. RMSE RESULTS WHEN K=250 AND THE WEIGHTED SUM FUNCTION IS USED

<b>RMSE (K=250 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.614	1.135	0.985	0.727	1.178	0.95	1.198	1.193	4.222	1.1
<b>MANH</b>	0.618	1.163	1.065	0.769	1.232	0.997	1.198	1.23	4.455	1.121
<b>EUCL</b>	0.617	1.158	1.064	0.767	1.229	0.995	1.195	1.227	4.439	1.121
<b>CHEB</b>	0.618	1.155	1.064	0.764	1.226	0.993	1.194	1.222	4.439	1.118
<b>PCC</b>	0.667	1.202	1.082	0.796	1.224	1.019	1.281	1.282	4.486	1.154
<b>CPCC</b>	0.613	1.137	1.065	0.754	1.2	0.981	1.206	1.232	4.288	1.124
<b>SPCC</b>	0.664	1.191	1.051	0.778	1.216	1.011	1.294	1.255	4.346	1.099
<b>COS</b>	0.616	1.148	1.078	0.754	1.219	0.987	1.199	1.226	4.693	1.144
<b>ACOS</b>	0.68	1.205	1.072	0.817	1.203	1.007	1.279	1.305	4.28	1.118
<b>SP</b>	0.588	1.148	1.054	0.759	1.113	0.923	1.262	1.312	4.303	1.145
<b>TAU</b>	0.619	1.175	1.124	0.784	1.22	0.993	1.235	1.262	4.638	1.188
<b>MSD</b>	0.613	1.132	1.057	0.751	1.211	0.981	1.192	1.202	4.341	1.104
<b>NSM</b>	0.616	1.138	1.062	0.752	1.218	0.983	1.194	1.209	4.686	1.114
<b>ARI</b>	0.614	1.162	1.046	0.757	1.086	0.869	1.306	1.293	4.532	1.158
<b>AMI</b>	0.615	1.171	1.115	0.774	1.209	0.979	1.214	1.253	4.426	1.183

Table 4 depicts the prediction F1-measure results when K=250 and the weighted sum function is used.

TABLE 4. F1 RESULTS WHEN K=250 AND THE WEIGHTED SUM FUNCTION IS USED

<b>F1-measure (K=250 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book-crossing</b>	<b>Yahoo-Movies</b>
<b>JACC</b>	0.965	0.875	0.896	0.939	0.892	0.927	0.842	0.802	0.158	0.863
<b>MANH</b>	0.964	0.873	0.880	0.933	0.884	0.922	0.849	0.807	0.196	0.882
<b>EUCL</b>	0.965	0.874	0.880	0.933	0.884	0.922	0.848	0.808	0.196	0.882
<b>CHEB</b>	0.965	0.873	0.880	0.934	0.884	0.922	0.845	0.806	0.191	0.882
<b>PCC</b>	0.960	0.870	0.878	0.931	0.888	0.922	0.829	0.797	0.223	0.870
<b>CPCC</b>	0.965	0.880	0.881	0.936	0.890	0.924	0.848	0.812	0.230	0.881
<b>SPCC</b>	0.961	0.872	0.886	0.934	0.890	0.923	0.829	0.799	0.222	0.874
<b>COS</b>	0.964	0.874	0.878	0.935	0.884	0.922	0.841	0.804	0.244	0.877
<b>ACOS</b>	0.963	0.878	0.881	0.932	0.896	0.927	0.847	0.798	0.257	0.881
<b>SP</b>	0.970	0.885	0.887	0.940	0.910	0.936	0.848	0.787	0.161	0.871
<b>TAU</b>	0.965	0.872	0.871	0.931	0.885	0.922	0.836	0.798	0.139	0.870
<b>MSD</b>	0.965	0.878	0.881	0.936	0.886	0.924	0.844	0.810	0.210	0.883
<b>NSM</b>	0.965	0.877	0.881	0.936	0.885	0.923	0.843	0.811	0.258	0.882
<b>ARI</b>	0.966	0.881	0.887	0.938	0.913	0.941	0.806	0.784	0.203	0.858
<b>AMI</b>	0.965	0.869	0.867	0.932	0.887	0.923	0.838	0.792	0.173	0.866

Table 5 depicts the prediction coverage results when K=250 and the weighted sum function is used.

TABLE 5. PREDICTION COVERAGE RESULTS WHEN K=250 AND THE WEIGHTED SUM FUNCTION IS USED

coverage (K=250 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	40.17	58.01	15.48	70.03	23.37	44.34	10.99	46.2	46.89	85.93
MANH	39.96	53.83	11.26	63.82	26.2	45.27	10.76	42.37	36.06	79.42
EUCL	39.97	54.08	11.27	63.89	26.29	45.34	10.84	42.57	36.12	79.45
CHEB	39.99	54.47	11.33	64.47	26.45	45.69	10.96	43.37	36.41	79.92
PCC	32.14	47.24	10.87	59	21.06	36.78	7.72	38.86	29.54	76.79
CPCC	39.61	52.83	11.01	64.22	24.94	45.03	10.02	41.41	31.81	79.54
SPCC	32.44	48.83	14.22	63.1	21.62	37.56	7.76	42.64	33.19	82.68
COS	40.15	55.5	11.54	66.07	26.83	46.58	11.02	43.24	31.64	81.36
ACOS	26.48	38.14	10.38	54.51	16.66	30.45	5.52	34.39	28.51	78.4
SP	24.2	36.84	11.63	52.79	15.4	30.5	4.01	31.5	32.89	79.87
TAU	38.12	49.55	10.76	61.4	23.75	42.18	9.36	39.94	35.96	81.25
MSD	40.05	56.14	11.58	65.9	26.3	46.4	10.95	45.32	36.7	80.81
NSM	40.17	56.93	11.57	65.73	27	46.95	11.08	44.66	32.04	80.46
ARI	15.26	30	11.72	45.98	11.3	23.83	2.54	30.44	30.51	77.87
AMI	35.72	48.57	10.15	60.41	21.92	38.76	8.75	39.91	37.17	80.24

Table 6 depicts the prediction MAE results when K=500 and the weighted sum function is used.

TABLE 6. MAE RESULTS WHEN K=500 AND THE WEIGHTED SUM FUNCTION IS USED

<b>MAE (K=500 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.248	0.673	0.572	0.413	0.608	0.47	0.826	0.867	2.999	0.79
<b>MANH</b>	0.253	0.686	0.625	0.44	0.664	0.512	0.826	0.884	3.048	0.755
<b>EUCL</b>	0.253	0.684	0.625	0.439	0.663	0.511	0.824	0.882	3.052	0.755
<b>CHEB</b>	0.252	0.683	0.624	0.437	0.663	0.507	0.824	0.878	3.07	0.755
<b>PCC</b>	0.273	0.71	0.639	0.455	0.641	0.512	0.881	0.924	3.066	0.782
<b>CPCC</b>	0.249	0.662	0.622	0.429	0.636	0.501	0.827	0.879	2.771	0.76
<b>SPCC</b>	0.272	0.706	0.633	0.448	0.638	0.507	0.892	0.913	2.997	0.773
<b>COS</b>	0.253	0.681	0.63	0.432	0.66	0.51	0.826	0.883	3.535	0.785
<b>ACOS</b>	0.264	0.693	0.628	0.458	0.603	0.49	0.86	0.943	2.753	0.744
<b>SP</b>	0.22	0.651	0.609	0.414	0.536	0.446	0.85	0.947	2.632	0.778
<b>TAU</b>	0.251	0.688	0.667	0.443	0.651	0.504	0.857	0.91	3.244	0.817
<b>MSD</b>	0.251	0.67	0.618	0.429	0.65	0.506	0.823	0.865	2.967	0.739
<b>NSM</b>	0.252	0.675	0.62	0.43	0.658	0.508	0.824	0.869	3.496	0.745
<b>ARI</b>	0.228	0.664	0.608	0.42	0.503	0.392	0.91	0.946	3.112	0.81
<b>AMI</b>	0.246	0.69	0.668	0.437	0.636	0.487	0.839	0.905	3.118	0.816



Table 7 depicts the prediction RMSE results when K=500 and the weighted sum function is used.

TABLE 7. RMSE RESULTS WHEN K=500 AND THE WEIGHTED SUM FUNCTION IS USED

<b>RMSE (K=500 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.615	1.131	0.994	0.731	1.178	0.95	1.199	1.177	4.165	1.095
<b>MANH</b>	0.621	1.154	1.062	0.763	1.234	0.996	1.199	1.207	4.375	1.105
<b>EUCL</b>	0.62	1.147	1.061	0.76	1.23	0.992	1.196	1.202	4.359	1.104
<b>CHEB</b>	0.619	1.143	1.06	0.757	1.228	0.985	1.195	1.195	4.356	1.099
<b>PCC</b>	0.667	1.204	1.086	0.799	1.225	1.024	1.285	1.274	4.414	1.124
<b>CPCC</b>	0.613	1.123	1.058	0.746	1.2	0.977	1.208	1.209	4.159	1.097
<b>SPCC</b>	0.665	1.199	1.068	0.788	1.222	1.018	1.303	1.256	4.348	1.094
<b>COS</b>	0.618	1.135	1.065	0.748	1.22	0.982	1.196	1.197	4.594	1.127
<b>ACOS</b>	0.688	1.221	1.077	0.834	1.201	1.028	1.282	1.319	4.152	1.093
<b>SP</b>	0.588	1.157	1.054	0.769	1.114	0.931	1.262	1.32	4.105	1.121
<b>TAU</b>	0.62	1.16	1.108	0.773	1.22	0.988	1.24	1.245	4.523	1.17
<b>MSD</b>	0.614	1.121	1.049	0.743	1.21	0.978	1.191	1.176	4.226	1.074
<b>NSM</b>	0.617	1.127	1.053	0.745	1.217	0.98	1.193	1.182	4.579	1.088
<b>ARI</b>	0.614	1.179	1.05	0.775	1.087	0.878	1.307	1.31	4.458	1.14
<b>AMI</b>	0.615	1.155	1.106	0.762	1.206	0.97	1.213	1.224	4.373	1.16

Table 8 depicts the prediction F1-measure results when K=500 and the weighted sum function is used.

TABLE 8. RMSE RESULTS WHEN K=500 AND THE WEIGHTED SUM FUNCTION IS USED

<b>F1-measure (K=500 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.965	0.876	0.895	0.938	0.892	0.927	0.842	0.807	0.145	0.867
<b>MANH</b>	0.964	0.874	0.882	0.934	0.883	0.921	0.846	0.810	0.184	0.884
<b>EUCL</b>	0.965	0.875	0.883	0.934	0.883	0.922	0.845	0.810	0.182	0.884
<b>CHEB</b>	0.965	0.875	0.883	0.934	0.883	0.922	0.843	0.809	0.175	0.884
<b>PCC</b>	0.960	0.870	0.879	0.931	0.888	0.921	0.831	0.798	0.227	0.872
<b>CPCC</b>	0.965	0.882	0.885	0.937	0.890	0.925	0.848	0.816	0.223	0.886
<b>SPCC</b>	0.961	0.871	0.884	0.933	0.889	0.922	0.830	0.800	0.224	0.873
<b>COS</b>	0.964	0.876	0.882	0.935	0.884	0.922	0.840	0.809	0.222	0.880
<b>ACOS</b>	0.962	0.879	0.884	0.932	0.897	0.925	0.848	0.798	0.258	0.882
<b>SP</b>	0.970	0.885	0.891	0.940	0.910	0.934	0.848	0.786	0.156	0.873
<b>TAU</b>	0.965	0.875	0.875	0.933	0.885	0.922	0.835	0.801	0.130	0.873
<b>MSD</b>	0.965	0.879	0.885	0.937	0.886	0.924	0.844	0.813	0.193	0.886
<b>NSM</b>	0.965	0.878	0.885	0.936	0.885	0.923	0.843	0.814	0.236	0.886
<b>ARI</b>	0.966	0.879	0.889	0.937	0.913	0.940	0.806	0.784	0.206	0.860
<b>AMI</b>	0.965	0.872	0.869	0.934	0.887	0.925	0.838	0.797	0.167	0.869

Table 9 depicts the prediction coverage results when K=500 and the weighted sum function is used.

TABLE 9. PREDICTION COVERAGE RESULTS WHEN K=500 AND THE WEIGHTED SUM FUNCTION IS USED

coverage (K=500 & weighted sum )	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	40.44	59.42	17.15	72.42	23.37	44.74	11.08	49.93	50.29	89.53
MANH	40.55	58.88	14.17	69.51	28.01	48.04	11.19	48.31	42.42	85.21
EUCL	40.56	59.13	14.18	69.59	28.06	48.18	11.19	48.58	42.49	85.25
CHEB	40.57	59.42	14.36	70.11	28.15	48.58	11.19	49.54	42.96	86.13
PCC	32.5	49.92	13.69	63.47	22.11	38.43	7.63	43.54	34.04	82.86
CPCC	40.06	56.93	14.09	69.65	26.46	47.53	10.07	47.17	37.68	85.76
SPCC	32.6	50.37	16.18	65.27	22.27	38.7	7.67	45.77	36.09	85.98
COS	40.62	60.02	14.6	70.98	28.47	49	11.19	49.58	37.9	86.98
ACOS	26.36	37.8	12.91	56.56	17.13	30.47	5.38	36.19	32.65	83.85
SP	24.25	36.49	14.55	53.8	15.37	30.44	4.01	32.82	39.57	84.58
TAU	38.7	54.66	13.23	67.02	25.14	44.72	9.36	45.18	42.06	86.77
MSD	40.47	59.8	14.99	71.13	27.86	48.7	11.03	51.57	44.09	87.47
NSM	40.6	60.68	14.96	71.07	28.65	49.27	11.19	51.13	38.24	87.09
ARI	15.25	29.15	14.17	45.91	11.21	23.53	2.54	30.97	32.59	83.05
AMI	36.15	53.37	12.85	65.94	23.38	41.5	8.77	45.7	41.97	85.55

### 2.1.2 Experiments using the KNNs neighbor selection with the mean-centered prediction function

Table 10 depicts the prediction MAE results when K=250 and the mean-centered function is used.

TABLE 10. MAE RESULTS WHEN K=250 AND THE MEAN-CENTERED FUNCTION IS USED

<b>MAE (K=250 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.298	0.675	0.557	0.441	0.643	0.493	0.689	0.846	2.667	0.713
<b>MANH</b>	0.304	0.701	0.638	0.473	0.694	0.538	0.69	0.879	2.902	0.756
<b>EUCL</b>	0.304	0.699	0.638	0.472	0.693	0.537	0.688	0.876	2.898	0.756
<b>CHEB</b>	0.304	0.697	0.638	0.469	0.693	0.537	0.685	0.874	2.898	0.754
<b>PCC</b>	0.329	0.723	0.638	0.484	0.683	0.538	0.769	0.903	2.935	0.773
<b>CPCC</b>	0.302	0.689	0.642	0.463	0.674	0.529	0.691	0.877	2.86	0.757
<b>SPCC</b>	0.328	0.714	0.612	0.472	0.673	0.534	0.765	0.884	2.812	0.732
<b>COS</b>	0.303	0.692	0.648	0.461	0.689	0.536	0.689	0.873	3.068	0.754
<b>ACOS</b>	0.348	0.738	0.644	0.503	0.671	0.522	0.774	0.93	2.84	0.758
<b>SP</b>	0.273	0.673	0.612	0.451	0.582	0.472	0.754	0.92	2.687	0.75
<b>TAU</b>	0.305	0.709	0.686	0.475	0.688	0.538	0.724	0.895	2.94	0.769
<b>MSD</b>	0.303	0.685	0.636	0.461	0.684	0.531	0.69	0.862	2.892	0.748
<b>NSM</b>	0.304	0.688	0.638	0.463	0.689	0.534	0.687	0.866	3.068	0.751
<b>ARI</b>	0.284	0.675	0.592	0.449	0.545	0.418	0.798	0.912	2.855	0.765
<b>AMI</b>	0.299	0.698	0.675	0.467	0.67	0.516	0.717	0.892	2.822	0.767

Table 11 depicts the prediction RMSE results when K=250 and the mean-centered function is used.

TABLE 11. RMSE RESULTS WHEN K=250 AND THE MEAN-CENTERED FUNCTION IS USED

<b>RMSE (K=250 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.601	1.061	0.928	0.709	1.126	0.912	0.977	1.149	3.712	1.014
<b>MANH</b>	0.607	1.093	1.009	0.747	1.176	0.957	0.977	1.193	3.945	1.069
<b>EUCL</b>	0.606	1.089	1.009	0.745	1.173	0.955	0.973	1.19	3.937	1.069
<b>CHEB</b>	0.606	1.085	1.008	0.743	1.171	0.954	0.971	1.185	3.932	1.066
<b>PCC</b>	0.659	1.146	1.021	0.779	1.181	0.993	1.099	1.236	4.052	1.087
<b>CPCC</b>	0.605	1.085	1.013	0.736	1.155	0.947	0.987	1.197	3.954	1.069
<b>SPCC</b>	0.659	1.135	0.992	0.762	1.172	0.985	1.094	1.21	3.941	1.042
<b>COS</b>	0.604	1.077	1.015	0.732	1.164	0.949	0.975	1.182	4.094	1.064
<b>ACOS</b>	0.737	1.198	1.032	0.832	1.19	1.008	1.131	1.279	3.993	1.076
<b>SP</b>	0.584	1.105	1.002	0.754	1.079	0.904	1.073	1.268	3.778	1.072
<b>TAU</b>	0.608	1.106	1.048	0.758	1.168	0.958	1.025	1.214	3.922	1.083
<b>MSD</b>	0.603	1.07	1.005	0.731	1.159	0.944	0.976	1.169	3.915	1.058
<b>NSM</b>	0.604	1.071	1.006	0.733	1.164	0.945	0.973	1.173	4.105	1.062
<b>ARI</b>	0.606	1.105	0.98	0.743	1.047	0.846	1.145	1.244	4.007	1.081
<b>AMI</b>	0.604	1.095	1.043	0.746	1.155	0.94	1.003	1.206	3.875	1.084

Table 12 depicts the prediction F1-measure results when K=250 and the mean-centered function is used.

TABLE 12. F1-MEASURE RESULTS WHEN K=250 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (K=250 &amp; mean-centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book-crossing</b>	<b>Yahoo-Movies</b>
<b>JACC</b>	0.965	0.882	0.903	0.939	0.893	0.928	0.861	0.813	0.283	0.875
<b>MANH</b>	0.964	0.876	0.883	0.933	0.884	0.921	0.865	0.811	0.309	0.872
<b>EUCL</b>	0.965	0.877	0.883	0.934	0.884	0.921	0.865	0.811	0.311	0.872
<b>CHEB</b>	0.965	0.877	0.883	0.934	0.885	0.921	0.865	0.811	0.312	0.872
<b>PCC</b>	0.960	0.873	0.883	0.931	0.887	0.920	0.841	0.803	0.312	0.866
<b>CPCC</b>	0.965	0.881	0.883	0.936	0.889	0.923	0.862	0.813	0.277	0.873
<b>SPCC</b>	0.960	0.875	0.891	0.933	0.889	0.922	0.844	0.806	0.310	0.874
<b>COS</b>	0.965	0.879	0.882	0.936	0.885	0.922	0.863	0.812	0.336	0.873
<b>ACOS</b>	0.957	0.875	0.883	0.929	0.892	0.924	0.853	0.798	0.303	0.872
<b>SP</b>	0.969	0.887	0.892	0.939	0.909	0.934	0.855	0.793	0.278	0.872
<b>TAU</b>	0.964	0.876	0.875	0.933	0.886	0.921	0.852	0.805	0.280	0.869
<b>MSD</b>	0.965	0.881	0.884	0.936	0.886	0.923	0.861	0.813	0.303	0.873
<b>NSM</b>	0.965	0.880	0.883	0.936	0.885	0.922	0.863	0.813	0.340	0.872
<b>ARI</b>	0.965	0.883	0.894	0.938	0.913	0.941	0.815	0.792	0.277	0.865
<b>AMI</b>	0.965	0.876	0.874	0.934	0.888	0.924	0.853	0.804	0.298	0.869

As far as the prediction coverage when K=250 is concerned, it is the exact same, when the weighted sum prediction function was used (TABLE 5).

Table 13 depicts the prediction MAE results when K=500 and the mean-centered function is used.

TABLE 13. MAE RESULTS WHEN K=500 AND THE MEAN-CENTERED FUNCTION IS USED

<b>MAE (K=500 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.299	0.674	0.568	0.445	0.643	0.494	0.691	0.839	2.652	0.711
<b>MANH</b>	0.305	0.696	0.637	0.471	0.697	0.542	0.695	0.866	2.843	0.746
<b>EUCL</b>	0.305	0.693	0.637	0.469	0.696	0.541	0.693	0.863	2.839	0.746
<b>CHEB</b>	0.305	0.691	0.637	0.466	0.696	0.537	0.691	0.859	2.838	0.742
<b>PCC</b>	0.33	0.726	0.642	0.486	0.682	0.547	0.767	0.897	2.871	0.752
<b>CPCC</b>	0.302	0.683	0.638	0.46	0.676	0.533	0.693	0.864	2.779	0.743
<b>SPCC</b>	0.329	0.721	0.629	0.478	0.679	0.543	0.768	0.885	2.809	0.728
<b>COS</b>	0.304	0.686	0.636	0.46	0.692	0.539	0.691	0.857	2.978	0.744
<b>ACOS</b>	0.353	0.759	0.647	0.515	0.67	0.544	0.774	0.942	2.746	0.746
<b>SP</b>	0.274	0.681	0.616	0.456	0.584	0.483	0.754	0.924	2.548	0.731
<b>TAU</b>	0.305	0.702	0.674	0.472	0.689	0.54	0.729	0.885	2.873	0.757
<b>MSD</b>	0.303	0.68	0.633	0.459	0.684	0.536	0.69	0.846	2.819	0.731
<b>NSM</b>	0.304	0.683	0.634	0.46	0.69	0.538	0.69	0.85	2.974	0.735
<b>ARI</b>	0.284	0.688	0.602	0.458	0.547	0.425	0.799	0.923	2.791	0.753
<b>AMI</b>	0.299	0.689	0.661	0.463	0.668	0.514	0.716	0.876	2.808	0.756

Table 14 depicts the prediction RMSE results when K=500 and the mean-centered function is used.

TABLE 14. RMSE RESULTS WHEN K=500 AND THE MEAN-CENTERED FUNCTION IS USED

<b>RMSE (K=500 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.602	1.058	0.937	0.712	1.126	0.912	0.978	1.136	3.666	1.012
<b>MANH</b>	0.608	1.084	1.006	0.742	1.177	0.956	0.981	1.17	3.878	1.052
<b>EUCL</b>	0.607	1.078	1.005	0.739	1.174	0.953	0.978	1.166	3.869	1.052
<b>CHEB</b>	0.606	1.074	1.003	0.736	1.172	0.947	0.977	1.159	3.857	1.047
<b>PCC</b>	0.66	1.154	1.025	0.784	1.183	1.001	1.096	1.231	4.002	1.061
<b>CPCC</b>	0.605	1.074	1.007	0.729	1.155	0.944	0.988	1.178	3.866	1.046
<b>SPCC</b>	0.66	1.147	1.008	0.773	1.18	0.995	1.099	1.214	3.943	1.034
<b>COS</b>	0.605	1.064	1.001	0.727	1.164	0.944	0.977	1.155	3.985	1.048
<b>ACOS</b>	0.748	1.235	1.04	0.859	1.195	1.038	1.134	1.3	3.915	1.061
<b>SP</b>	0.584	1.118	1.006	0.765	1.082	0.914	1.073	1.28	3.672	1.05
<b>TAU</b>	0.608	1.095	1.037	0.751	1.169	0.955	1.03	1.201	3.846	1.065
<b>MSD</b>	0.602	1.058	0.997	0.725	1.157	0.941	0.976	1.143	3.813	1.032
<b>NSM</b>	0.604	1.059	0.997	0.726	1.162	0.942	0.975	1.146	3.995	1.036
<b>ARI</b>	0.606	1.13	0.988	0.766	1.051	0.86	1.144	1.266	3.965	1.066
<b>AMI</b>	0.603	1.08	1.033	0.737	1.152	0.932	1.002	1.181	3.84	1.067



Table 15 depicts the prediction F1-measure results when K=500 and the mean-centered function is used.

TABLE 15. F1-MEASURE RESULTS WHEN K=500 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (K=500 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.965	0.882	0.902	0.938	0.893	0.928	0.861	0.817	0.275	0.878
<b>MANH</b>	0.964	0.878	0.886	0.934	0.884	0.921	0.863	0.813	0.301	0.874
<b>EUCL</b>	0.965	0.879	0.886	0.935	0.884	0.921	0.863	0.814	0.302	0.874
<b>CHEB</b>	0.965	0.879	0.886	0.935	0.884	0.922	0.862	0.815	0.301	0.875
<b>PCC</b>	0.960	0.873	0.885	0.931	0.887	0.919	0.844	0.804	0.303	0.871
<b>CPCC</b>	0.965	0.884	0.887	0.937	0.890	0.923	0.862	0.817	0.262	0.876
<b>SPCC</b>	0.960	0.874	0.889	0.932	0.888	0.921	0.845	0.806	0.303	0.875
<b>COS</b>	0.965	0.881	0.887	0.936	0.885	0.922	0.861	0.815	0.322	0.876
<b>ACOS</b>	0.957	0.873	0.886	0.928	0.892	0.920	0.854	0.796	0.288	0.875
<b>SP</b>	0.969	0.885	0.895	0.938	0.909	0.933	0.855	0.792	0.272	0.875
<b>TAU</b>	0.965	0.879	0.879	0.934	0.886	0.922	0.852	0.807	0.274	0.872
<b>MSD</b>	0.965	0.883	0.888	0.937	0.887	0.923	0.862	0.817	0.291	0.877
<b>NSM</b>	0.965	0.882	0.888	0.937	0.885	0.923	0.862	0.817	0.327	0.877
<b>ARI</b>	0.965	0.881	0.896	0.936	0.913	0.939	0.816	0.790	0.280	0.867
<b>AMI</b>	0.965	0.878	0.878	0.935	0.889	0.925	0.853	0.807	0.291	0.872

As far as the prediction coverage when K=500 is concerned, it is the exact same, when the weighted sum prediction function was used (TABLE 9).

### 2.1.3 Experiments using the similarity threshold neighbor selection with the weighted sum prediction function

Table 16 depicts the prediction MAE results when THR=0.0 and the weighted sum function is used.

TABLE 16. MAE RESULTS WHEN THR=0.0 AND THE WEIGHTED SUM FUNCTION IS USED

MAE (THR=0.0 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	0.248	0.673	0.6	0.417	0.608	0.47	0.826	0.861	2.995	0.8
MANH	0.253	0.686	0.661	0.441	0.663	0.517	0.826	0.863	2.993	0.778
EUCL	0.253	0.684	0.66	0.438	0.662	0.517	0.824	0.859	3.014	0.782
CHEB	0.252	0.683	0.661	0.437	0.662	0.517	0.824	0.858	3.042	0.786
PCC	0.261	0.681	0.66	0.438	0.628	0.495	0.853	0.867	3.117	0.788
CPCC	0.248	0.663	0.646	0.429	0.637	0.516	0.814	0.85	2.738	0.77
SPCC	0.26	0.678	0.655	0.434	0.626	0.491	0.852	0.866	3.102	0.788
COS	0.253	0.684	0.673	0.436	0.664	0.527	0.826	0.861	3.431	0.809
ACOS	0.241	0.651	0.628	0.419	0.581	0.462	0.823	0.865	2.677	0.736
SP	0.217	0.628	0.62	0.392	0.53	0.433	0.822	0.871	2.834	0.784
TAU	0.25	0.676	0.659	0.431	0.644	0.512	0.847	0.86	3.022	0.792
MSD	0.251	0.675	0.663	0.434	0.653	0.522	0.822	0.856	2.972	0.79
NSM	0.252	0.681	0.666	0.435	0.662	0.525	0.824	0.858	3.399	0.797
ARI	0.226	0.643	0.62	0.401	0.5	0.385	0.89	0.899	3.143	0.802
AMI	0.246	0.688	0.674	0.435	0.635	0.495	0.839	0.873	3.084	0.799

Table 17 depicts the prediction RMSE results when THR=0.0 and the weighted sum function is used.

TABLE 17. RMSE RESULTS WHEN THR=0.0 AND THE WEIGHTED SUM FUNCTION IS USED

<b>RMSE (THR=0.0 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.615	1.13	1.004	0.732	1.178	0.95	1.199	1.162	4.106	1.096
<b>MANH</b>	0.621	1.144	1.046	0.754	1.229	0.988	1.199	1.165	4.197	1.09
<b>EUCL</b>	0.619	1.135	1.037	0.748	1.224	0.984	1.196	1.157	4.164	1.085
<b>CHEB</b>	0.619	1.133	1.035	0.746	1.222	0.982	1.195	1.154	4.151	1.085
<b>PCC</b>	0.633	1.147	1.053	0.752	1.2	0.974	1.228	1.173	4.279	1.084
<b>CPCC</b>	0.61	1.113	1.023	0.735	1.194	0.976	1.185	1.15	3.956	1.061
<b>SPCC</b>	0.632	1.143	1.047	0.748	1.197	0.969	1.227	1.171	4.264	1.082
<b>COS</b>	0.618	1.129	1.043	0.742	1.218	0.985	1.196	1.153	4.425	1.101
<b>ACOS</b>	0.61	1.126	1.031	0.737	1.155	0.949	1.206	1.182	3.931	1.037
<b>SP</b>	0.577	1.101	1.021	0.708	1.099	0.898	1.207	1.19	4.105	1.085
<b>TAU</b>	0.615	1.132	1.041	0.741	1.206	0.976	1.218	1.162	4.168	1.097
<b>MSD</b>	0.614	1.12	1.034	0.74	1.209	0.981	1.19	1.148	4.05	1.079
<b>NSM</b>	0.617	1.126	1.036	0.741	1.217	0.983	1.193	1.151	4.419	1.091
<b>ARI</b>	0.606	1.133	1.042	0.727	1.076	0.855	1.268	1.232	4.45	1.111
<b>AMI</b>	0.614	1.149	1.059	0.75	1.204	0.969	1.213	1.173	4.215	1.1

Table 18 depicts the prediction F1-measure results when THR=0.0 and the mean-centered function is used.

TABLE 18. F1-MEASURE RESULTS WHEN THR=0.0 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.0 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.965	0.876	0.891	0.938	0.892	0.927	0.842	0.810	0.137	0.871
<b>MANH</b>	0.964	0.875	0.884	0.935	0.884	0.922	0.846	0.814	0.152	0.879
<b>EUCL</b>	0.965	0.876	0.885	0.935	0.884	0.923	0.845	0.815	0.139	0.878
<b>CHEB</b>	0.965	0.876	0.885	0.936	0.884	0.923	0.843	0.814	0.130	0.877
<b>PCC</b>	0.962	0.875	0.882	0.935	0.890	0.925	0.836	0.810	0.164	0.871
<b>CPCC</b>	0.966	0.882	0.890	0.938	0.890	0.924	0.850	0.820	0.184	0.882
<b>SPCC</b>	0.963	0.876	0.884	0.936	0.891	0.926	0.838	0.810	0.162	0.871
<b>COS</b>	0.965	0.876	0.883	0.936	0.883	0.922	0.840	0.813	0.182	0.872
<b>ACOS</b>	0.966	0.882	0.890	0.938	0.901	0.930	0.854	0.811	0.210	0.886
<b>SP</b>	0.970	0.888	0.892	0.944	0.911	0.936	0.847	0.802	0.128	0.874
<b>TAU</b>	0.965	0.877	0.885	0.937	0.887	0.923	0.837	0.813	0.109	0.876
<b>MSD</b>	0.965	0.879	0.886	0.937	0.886	0.923	0.844	0.815	0.137	0.877
<b>NSM</b>	0.965	0.878	0.885	0.937	0.884	0.923	0.843	0.815	0.196	0.875
<b>ARI</b>	0.967	0.882	0.888	0.940	0.914	0.942	0.810	0.790	0.193	0.861
<b>AMI</b>	0.965	0.872	0.878	0.935	0.888	0.925	0.838	0.805	0.148	0.869

Table 19 depicts the prediction coverage results when THR=0.0 and the weighted sum function is used.

TABLE 19. PREDICTION COVERAGE RESULTS WHEN THR=0.0 AND THE WEIGHTED SUM FUNCTION IS USED

coverage (THR=0.0 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	40.46	59.74	19.39	74.03	23.37	44.74	11.08	53.01	53.07	96.31
MANH	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	61.12	96.52
EUCL	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	61.94	96.57
CHEB	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	61.94	96.57
PCC	33.32	54.13	20.66	69.39	23.39	41.61	8.45	54.19	52.13	93.23
CPCC	40.26	58.68	21.37	73.92	27.19	48.56	10.25	56.25	57.01	96.12
SPCC	33.31	54.12	20.66	69.39	23.38	41.6	8.44	54.18	52.12	93.23
COS	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	47.58	96.57
ACOS	30.51	48.48	19.93	67.56	19.56	37.24	6.66	49.22	52.55	94.72
SP	24.9	40.63	17.86	58.34	16.13	32.48	4.45	41.5	51.15	94.47
TAU	39.62	58.61	21.39	73.19	26.82	47.33	9.85	56.37	60.17	96.27
MSD	40.61	60.59	21.75	74.62	28.37	49.36	11.03	58.53	60.8	96.43
NSM	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	47.56	96.57
ARI	15.51	31.91	16.05	48.67	11.6	24.73	2.89	35.92	37.2	89.35
AMI	36.27	54.38	20.81	70.12	23.77	42.21	8.77	55.18	56.44	95.66

Table 20 depicts the prediction MAE results when THR=0.25 and the weighted sum function is used. When THR=0.25, the Jaccard Index presents a very low prediction coverage (~5.5% on average), where the rating prediction results are unreliable and hence it does not take part in the accuracy results.

TABLE 20. MAE RESULTS WHEN THR=0.25 AND THE WEIGHTED SUM FUNCTION IS USED

<b>MAE (THR=0.25 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.239	0.658	0.636	0.438	0.602	0.491	0.826	0.875	2.64	0.746
<b>EUCL</b>	0.245	0.665	0.647	0.436	0.619	0.501	0.795	0.866	2.662	0.751
<b>CHEB</b>	0.246	0.664	0.647	0.432	0.621	0.5	0.788	0.859	2.662	0.751
<b>PCC</b>	0.257	0.676	0.658	0.435	0.613	0.485	0.851	0.868	3.121	0.784
<b>CPCC</b>	0.248	0.659	0.644	0.429	0.632	0.514	0.806	0.849	2.647	0.767
<b>SPCC</b>	0.254	0.671	0.65	0.43	0.603	0.475	0.848	0.868	3.076	0.783
<b>COS</b>	0.253	0.684	0.673	0.436	0.664	0.527	0.826	0.861	3.488	0.809
<b>ACOS</b>	0.237	0.643	0.621	0.415	0.559	0.447	0.81	0.871	2.616	0.734
<b>SP</b>	0.211	0.617	0.612	0.387	0.501	0.414	0.796	0.874	2.751	0.779
<b>TAU</b>	0.25	0.675	0.658	0.431	0.641	0.51	0.844	0.86	3	0.79
<b>MSD</b>	0.251	0.673	0.662	0.433	0.651	0.522	0.816	0.855	2.937	0.788
<b>NSM</b>	0.252	0.679	0.666	0.434	0.661	0.525	0.823	0.857	3.511	0.794
<b>ARI</b>	0.216	0.617	0.595	0.393	0.433	0.34	0.829	0.932	3.156	0.801
<b>AMI</b>	0.245	0.692	0.679	0.437	0.634	0.492	0.858	0.882	3.131	0.8

Table 21 depicts the prediction RMSE results when THR=0.25 and the weighted sum function is used.

TABLE 21. RMSE RESULTS WHEN THR=0.25 AND THE WEIGHTED SUM FUNCTION IS USED

<b>RMSE (THR=0.25 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.6	1.139	1.054	0.756	1.177	0.975	1.212	1.201	4.103	1.074
<b>EUCL</b>	0.607	1.134	1.05	0.748	1.189	0.977	1.171	1.176	4.11	1.065
<b>CHEB</b>	0.608	1.129	1.041	0.741	1.189	0.972	1.159	1.163	4.105	1.054
<b>PCC</b>	0.626	1.144	1.055	0.749	1.185	0.965	1.229	1.176	4.297	1.082
<b>CPCC</b>	0.609	1.11	1.022	0.734	1.19	0.973	1.177	1.15	3.889	1.057
<b>SPCC</b>	0.621	1.139	1.049	0.744	1.175	0.954	1.23	1.176	4.268	1.079
<b>COS</b>	0.618	1.129	1.043	0.742	1.218	0.985	1.196	1.153	4.476	1.101
<b>ACOS</b>	0.604	1.121	1.028	0.732	1.133	0.932	1.192	1.191	3.892	1.039
<b>SP</b>	0.567	1.093	1.016	0.703	1.067	0.875	1.188	1.196	4.061	1.082
<b>TAU</b>	0.614	1.132	1.041	0.741	1.204	0.975	1.216	1.163	4.16	1.095
<b>MSD</b>	0.614	1.117	1.032	0.739	1.206	0.98	1.182	1.147	4.016	1.076
<b>NSM</b>	0.616	1.124	1.036	0.741	1.216	0.983	1.191	1.15	4.549	1.087
<b>ARI</b>	0.587	1.117	1.031	0.72	1.001	0.808	1.236	1.282	4.545	1.126
<b>AMI</b>	0.611	1.158	1.073	0.755	1.207	0.971	1.238	1.184	4.269	1.107

Table 22 depicts the prediction F1-measure results when THR=0.25 and the mean-centered function is used.

TABLE 22. F1-MEASURE RESULTS WHEN THR=0.25 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.25 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.966	0.880	0.886	0.935	0.896	0.925	0.854	0.814	0.259	0.887
<b>EUCL</b>	0.966	0.879	0.886	0.936	0.893	0.924	0.857	0.815	0.278	0.887
<b>CHEB</b>	0.966	0.879	0.886	0.936	0.892	0.925	0.853	0.814	0.282	0.887
<b>PCC</b>	0.963	0.876	0.882	0.936	0.893	0.927	0.838	0.810	0.291	0.872
<b>CPCC</b>	0.966	0.883	0.891	0.938	0.891	0.925	0.853	0.820	0.262	0.883
<b>SPCC</b>	0.964	0.877	0.884	0.936	0.895	0.929	0.840	0.809	0.291	0.871
<b>COS</b>	0.965	0.876	0.883	0.936	0.883	0.922	0.840	0.813	0.315	0.872
<b>ACOS</b>	0.966	0.884	0.891	0.939	0.905	0.932	0.859	0.811	0.298	0.887
<b>SP</b>	0.971	0.890	0.893	0.945	0.917	0.940	0.858	0.800	0.257	0.874
<b>TAU</b>	0.965	0.877	0.885	0.937	0.887	0.924	0.839	0.813	0.265	0.876
<b>MSD</b>	0.965	0.879	0.886	0.937	0.886	0.923	0.846	0.815	0.269	0.877
<b>NSM</b>	0.965	0.878	0.885	0.937	0.884	0.923	0.843	0.816	0.328	0.876
<b>ARI</b>	0.968	0.887	0.891	0.942	0.926	0.949	0.834	0.785	0.275	0.863
<b>AMI</b>	0.965	0.871	0.875	0.935	0.887	0.925	0.835	0.803	0.280	0.870



Table 23 depicts the prediction coverage results when THR=0.25 and the weighted sum function is used.

TABLE 23. PREDICTION COVERAGE RESULTS WHEN THR=0.25 AND THE WEIGHTED SUM FUNCTION IS USED

coverage (THR=0.25 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	5.28	1.16	2.24	16.48	2.61	8.43	0	0.18	0.26	37.45
MANH	38.73	47.64	18.32	68.81	20.01	40.8	6.93	45.11	30.31	90.59
EUCL	39.75	53.47	20.12	72.7	22.59	44.61	8.87	51.19	31.06	93.41
CHEB	39.84	54.76	20.67	73.48	23.17	45.54	9.37	53.44	31.16	94.56
PCC	32.51	50.73	19.89	67.54	21.1	38.38	7.4	51.42	45.02	92.39
CPCC	40.19	58.19	21.29	73.84	26.78	48.31	9.98	55.65	53.51	95.98
SPCC	32.25	49.63	19.66	66.79	20.47	37.49	6.96	50.57	44.18	92.23
COS	40.73	61.44	21.84	74.75	29.17	49.89	11.19	58.95	44.88	96.57
ACOS	29.54	44.38	18.92	64.9	17.43	33.92	5.46	44.88	46.97	93.17
SP	23.76	37.15	17.01	56.05	14.38	29.72	3.51	38.35	47.71	93.48
TAU	39.56	58.25	21.31	73.06	26.5	47.06	9.6	55.85	59.32	96.12
MSD	40.58	60.37	21.72	74.58	28.21	49.26	10.94	58.33	59.84	96.39
NSM	40.72	61.33	21.83	74.74	29.09	49.86	11.16	58.89	37.97	96.49
ARI	14.69	24.89	13.52	44.13	9	20.38	1.79	26.87	23.95	83.28
AMI	35.94	52.41	20.25	68.61	22.06	39.62	8.09	52.98	49.77	94.07

Table 24 depicts the prediction MAE results when THR=0.5 and the weighted sum function is used. When THR=0.5, the Jaccard Index presents a very low prediction coverage (~1.6% on average), where the rating prediction results are unreliable and hence it does not take part in the accuracy results.

TABLE 24. MAE RESULTS WHEN THR=0.5 AND THE WEIGHTED SUM FUNCTION IS USED

MAE (THR=0.5 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	-	-	-	-	-	-	-	-	-	-
MANH	0.209	0.603	0.569	0.413	0.488	0.401	0.796	0.898	2.499	0.734
EUCL	0.209	0.603	0.569	0.413	0.488	0.401	0.796	0.898	2.499	0.734
CHEB	0.209	0.603	0.569	0.413	0.488	0.401	0.796	0.898	2.499	0.734
PCC	0.251	0.672	0.653	0.434	0.592	0.467	0.842	0.853	3.049	0.781
CPCC	0.243	0.649	0.636	0.426	0.614	0.507	0.792	0.829	2.533	0.76
SPCC	0.244	0.652	0.636	0.423	0.56	0.444	0.819	0.856	2.904	0.775
COS	0.253	0.684	0.673	0.436	0.663	0.527	0.827	0.83	3.572	0.809
ACOS	0.232	0.639	0.615	0.415	0.539	0.433	0.816	0.875	2.583	0.735
SP	0.201	0.587	0.584	0.375	0.445	0.379	0.743	0.864	2.482	0.768
TAU	0.247	0.671	0.652	0.428	0.626	0.503	0.845	0.841	2.943	0.785
MSD	0.248	0.666	0.657	0.431	0.638	0.517	0.812	0.825	2.819	0.78
NSM	0.251	0.672	0.661	0.433	0.653	0.523	0.817	0.826	3.534	0.787
ARI	0.205	0.602	0.575	0.394	0.347	0.26	0.862	0.934	3.204	0.802
AMI	0.242	0.7	0.687	0.444	0.619	0.479	0.859	0.868	3.101	0.802

Table 25 depicts the prediction RMSE results when THR=0.5 and the weighted sum function is used.

TABLE 25. RMSE RESULTS WHEN THR=0.5 AND THE WEIGHTED SUM FUNCTION IS USED

<b>RMSE (THR=0.5 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.561	1.109	1.01	0.741	1.068	0.892	1.212	1.241	4.024	1.098
<b>EUCL</b>	0.561	1.109	1.01	0.741	1.068	0.892	1.212	1.241	4.024	1.098
<b>CHEB</b>	0.561	1.109	1.01	0.741	1.068	0.892	1.212	1.241	4.024	1.098
<b>PCC</b>	0.618	1.149	1.065	0.753	1.168	0.95	1.226	1.154	4.298	1.088
<b>CPCC</b>	0.601	1.102	1.018	0.73	1.171	0.966	1.168	1.121	3.839	1.051
<b>SPCC</b>	0.605	1.132	1.052	0.742	1.136	0.928	1.217	1.162	4.215	1.082
<b>COS</b>	0.618	1.128	1.043	0.742	1.218	0.985	1.197	1.113	4.601	1.101
<b>ACOS</b>	0.597	1.124	1.032	0.735	1.115	0.923	1.206	1.186	3.916	1.051
<b>SP</b>	0.55	1.074	1.003	0.692	1.004	0.84	1.112	1.178	3.918	1.086
<b>TAU</b>	0.612	1.136	1.047	0.74	1.191	0.97	1.226	1.133	4.167	1.1
<b>MSD</b>	0.61	1.111	1.028	0.736	1.194	0.974	1.181	1.111	3.938	1.066
<b>NSM</b>	0.613	1.116	1.031	0.739	1.208	0.98	1.183	1.111	4.704	1.08
<b>ARI</b>	0.572	1.116	1.023	0.727	0.9	0.708	1.337	1.267	4.705	1.144
<b>AMI</b>	0.608	1.18	1.099	0.768	1.199	0.966	1.251	1.165	4.291	1.121

Table 26 depicts the prediction F1-measure results when THR=0.5 and the mean-centered function is used.

TABLE 26. F1-MEASURE RESULTS WHEN THR=0.5 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.5 &amp; weighted sum)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.971	0.891	0.895	0.939	0.919	0.939	0.869	0.808	0.177	0.887
<b>EUCL</b>	0.971	0.891	0.895	0.939	0.919	0.939	0.869	0.808	0.177	0.887
<b>CHEB</b>	0.971	0.891	0.895	0.939	0.919	0.939	0.869	0.808	0.177	0.887
<b>PCC</b>	0.964	0.875	0.881	0.935	0.897	0.929	0.837	0.807	0.196	0.873
<b>CPCC</b>	0.966	0.885	0.893	0.939	0.895	0.926	0.861	0.822	0.206	0.885
<b>SPCC</b>	0.966	0.880	0.885	0.938	0.904	0.933	0.853	0.804	0.213	0.873
<b>COS</b>	0.965	0.876	0.883	0.936	0.883	0.922	0.840	0.813	0.223	0.872
<b>ACOS</b>	0.967	0.884	0.891	0.939	0.909	0.934	0.860	0.808	0.245	0.887
<b>SP</b>	0.973	0.896	0.897	0.947	0.927	0.945	0.876	0.796	0.134	0.877
<b>TAU</b>	0.965	0.878	0.885	0.937	0.891	0.925	0.839	0.813	0.097	0.878
<b>MSD</b>	0.966	0.881	0.887	0.937	0.889	0.924	0.847	0.816	0.162	0.879
<b>NSM</b>	0.965	0.880	0.886	0.937	0.886	0.923	0.846	0.817	0.308	0.877
<b>ARI</b>	0.970	0.888	0.890	0.941	0.940	0.960	0.841	0.778	0.236	0.861
<b>AMI</b>	0.965	0.867	0.871	0.933	0.890	0.926	0.837	0.799	0.165	0.870

Table 27 depicts the prediction coverage results when THR=0.5 and the weighted sum function is used.

TABLE 27. PREDICTION COVERAGE RESULTS WHEN THR=0.5 AND THE WEIGHTED SUM FUNCTION IS USED

coverage (THR=0.5 & weighted sum)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	3.04	0.62	1.94	2.48	2.05	7.8	0	0.01	0.11	7.51
MANH	29.41	25.25	11.58	49.04	11.02	25.14	1.8	23.44	26.88	78.95
EUCL	29.41	25.25	11.58	49.04	11.02	25.14	1.8	23.44	26.88	78.95
CHEB	29.41	25.25	11.58	49.04	11.02	25.14	1.8	23.44	26.88	78.95
PCC	31.49	45.56	18.4	64.02	18.21	34.25	5.8	46.48	37.92	90.09
CPCC	39.77	55.82	20.86	73.16	24.91	46.87	8.98	52.81	48.58	95.49
SPCC	30.5	41.78	17.47	61.14	16.41	32.08	4.57	42.68	35.32	89.24
COS	40.73	61.42	21.84	74.75	29.15	49.88	11.19	58.94	36.97	96.56
ACOS	28.47	39.31	17.33	60.81	15.37	30.73	4.36	39.9	40.29	90.59
SP	22.27	30.75	15	51.91	11.87	25.87	2.23	30.31	40.55	90.4
TAU	38.86	55.84	20.79	71.89	24.63	45.2	8.5	52.8	57.01	95.45
MSD	40.28	58.98	21.53	74.22	26.95	48.21	10.48	57.22	57.25	96.18
NSM	40.62	60.47	21.7	74.6	28.47	49.5	10.89	58.1	24.47	96.32
ARI	12.87	16.37	10.39	36.01	6.43	15.26	0.99	20.32	15.14	76.09
AMI	34.8	46.72	18.52	63.88	19.06	35.14	6.59	48.26	44.74	91.61

### 2.1.4 Experiments using the similarity threshold neighbor selection with the mean-centered prediction function

Table 28 depicts the prediction MAE results when THR=0.0 and the mean-centered function is used.

TABLE 28. MAE RESULTS WHEN THR=0.0 AND THE MEAN-CENTERED FUNCTION IS USED

<b>MAE (THR=0.0 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.299	0.674	0.584	0.447	0.643	0.494	0.691	0.832	2.627	0.718
<b>MANH</b>	0.305	0.691	0.639	0.467	0.693	0.543	0.695	0.839	2.666	0.725
<b>EUCL</b>	0.304	0.687	0.636	0.464	0.692	0.543	0.693	0.833	2.652	0.722
<b>CHEB</b>	0.304	0.686	0.635	0.462	0.691	0.543	0.691	0.831	2.647	0.721
<b>PCC</b>	0.313	0.684	0.633	0.461	0.661	0.521	0.718	0.837	2.693	0.721
<b>CPCC</b>	0.3	0.672	0.63	0.455	0.67	0.542	0.684	0.827	2.601	0.714
<b>SPCC</b>	0.312	0.681	0.629	0.458	0.659	0.517	0.717	0.836	2.689	0.719
<b>COS</b>	0.304	0.683	0.64	0.458	0.692	0.551	0.691	0.83	2.866	0.722
<b>ACOS</b>	0.295	0.668	0.625	0.453	0.621	0.491	0.696	0.852	2.576	0.714
<b>SP</b>	0.268	0.639	0.606	0.425	0.571	0.462	0.723	0.843	2.529	0.71
<b>TAU</b>	0.302	0.682	0.637	0.457	0.678	0.54	0.706	0.833	2.629	0.72
<b>MSD</b>	0.302	0.678	0.637	0.457	0.684	0.547	0.689	0.827	2.628	0.718
<b>NSM</b>	0.303	0.682	0.638	0.458	0.691	0.55	0.69	0.829	2.867	0.72
<b>ARI</b>	0.279	0.652	0.606	0.432	0.539	0.412	0.768	0.872	2.808	0.735
<b>AMI</b>	0.298	0.687	0.641	0.459	0.667	0.52	0.716	0.843	2.694	0.723

Table 29 depicts the prediction RMSE results when THR=0.0 and the mean-centered function is used.

TABLE 29. RMSE RESULTS WHEN THR=0.0 AND THE MEAN-CENTERED FUNCTION IS USED

<b>RMSE (THR=0.0 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.602	1.057	0.944	0.713	1.126	0.912	0.978	1.123	3.616	1.016
<b>MANH</b>	0.608	1.074	0.983	0.733	1.172	0.95	0.981	1.128	3.689	1.022
<b>EUCL</b>	0.607	1.066	0.975	0.728	1.167	0.945	0.978	1.12	3.651	1.017
<b>CHEB</b>	0.606	1.063	0.973	0.725	1.166	0.944	0.977	1.117	3.625	1.016
<b>PCC</b>	0.619	1.073	0.984	0.729	1.145	0.934	1.005	1.131	3.698	1.016
<b>CPCC</b>	0.599	1.051	0.969	0.716	1.144	0.94	0.969	1.116	3.599	1.007
<b>SPCC</b>	0.618	1.07	0.979	0.726	1.142	0.93	1.003	1.129	3.69	1.014
<b>COS</b>	0.604	1.056	0.976	0.72	1.162	0.946	0.977	1.114	3.842	1.019
<b>ACOS</b>	0.6	1.068	0.983	0.722	1.109	0.914	0.976	1.153	3.634	1.011
<b>SP</b>	0.566	1.033	0.961	0.69	1.055	0.868	1.009	1.144	3.534	1.007
<b>TAU</b>	0.602	1.06	0.976	0.72	1.153	0.938	0.993	1.122	3.577	1.016
<b>MSD</b>	0.602	1.053	0.973	0.719	1.155	0.944	0.975	1.112	3.583	1.013
<b>NSM</b>	0.604	1.055	0.973	0.72	1.161	0.945	0.975	1.113	3.859	1.016
<b>ARI</b>	0.592	1.059	0.977	0.705	1.033	0.826	1.075	1.181	3.912	1.035
<b>AMI</b>	0.602	1.075	0.989	0.728	1.15	0.931	1.002	1.133	3.708	1.024

Table 30 depicts the prediction F1-measure results when THR=0.0 and the mean-centered function is used.

TABLE 30. F1-MEASURE RESULTS WHEN THR=0.0 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.0 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.965	0.883	0.900	0.938	0.893	0.928	0.861	0.820	0.269	0.880
<b>MANH</b>	0.965	0.879	0.892	0.935	0.885	0.922	0.863	0.818	0.279	0.878
<b>EUCL</b>	0.965	0.881	0.894	0.936	0.885	0.923	0.863	0.819	0.281	0.879
<b>CHEB</b>	0.965	0.881	0.894	0.936	0.885	0.922	0.862	0.820	0.279	0.879
<b>PCC</b>	0.962	0.880	0.892	0.936	0.891	0.925	0.855	0.817	0.292	0.877
<b>CPCC</b>	0.966	0.885	0.896	0.938	0.891	0.923	0.865	0.822	0.263	0.881
<b>SPCC</b>	0.963	0.881	0.893	0.936	0.891	0.925	0.855	0.817	0.293	0.877
<b>COS</b>	0.965	0.882	0.893	0.937	0.885	0.922	0.861	0.821	0.311	0.879
<b>ACOS</b>	0.965	0.885	0.894	0.938	0.901	0.930	0.862	0.814	0.293	0.881
<b>SP</b>	0.970	0.892	0.899	0.944	0.911	0.937	0.856	0.810	0.263	0.880
<b>TAU</b>	0.965	0.883	0.894	0.937	0.888	0.923	0.857	0.820	0.265	0.880
<b>MSD</b>	0.965	0.884	0.894	0.937	0.887	0.922	0.862	0.821	0.273	0.880
<b>NSM</b>	0.965	0.883	0.894	0.937	0.885	0.922	0.862	0.821	0.314	0.879
<b>ARI</b>	0.966	0.886	0.896	0.941	0.914	0.942	0.818	0.798	0.278	0.870
<b>AMI</b>	0.965	0.879	0.890	0.936	0.889	0.925	0.853	0.814	0.280	0.878

As far as the prediction coverage when THR=0.0 is concerned, it is the exact same, when the weighted sum prediction function was used (TABLE 19).



Table 31 depicts the prediction MAE results when THR=0.25 and the mean-centered function is used. When THR=0.25, the Jaccard Index presents a very low prediction coverage (~5.5% on average), where the rating prediction results are unreliable and hence it does not take part in the accuracy results.

TABLE 31. MAE RESULTS WHEN THR=0.25 AND THE MEAN-CENTERED FUNCTION IS USED

MAE (THR=0.25 & mean- centered)	Digital_music	Videogames	Movies	Kindle	Cell_phones	Musical Instruments	Ciao	Epinions	Book- crossing	Yahoo- Movies
JACC	-	-	-	-	-	-	-	-	-	-
MANH	0.294	0.677	0.634	0.468	0.641	0.519	0.686	0.862	2.587	0.729
EUCL	0.299	0.68	0.638	0.464	0.656	0.528	0.673	0.848	2.601	0.72
CHEB	0.299	0.677	0.635	0.459	0.658	0.527	0.666	0.838	2.601	0.713
PCC	0.31	0.68	0.633	0.459	0.647	0.51	0.716	0.839	2.718	0.72
CPCC	0.299	0.67	0.629	0.454	0.667	0.54	0.677	0.827	2.553	0.713
SPCC	0.306	0.676	0.627	0.455	0.638	0.501	0.714	0.839	2.704	0.718
COS	0.304	0.683	0.64	0.458	0.692	0.551	0.691	0.83	2.925	0.722
ACOS	0.292	0.662	0.621	0.45	0.601	0.476	0.693	0.859	2.537	0.716
SP	0.262	0.631	0.601	0.421	0.544	0.443	0.71	0.847	2.479	0.708
TAU	0.302	0.682	0.637	0.457	0.676	0.54	0.703	0.834	2.626	0.72
MSD	0.302	0.677	0.636	0.457	0.682	0.547	0.685	0.827	2.619	0.718
NSM	0.303	0.681	0.637	0.458	0.69	0.549	0.69	0.828	3.042	0.72
ARI	0.269	0.634	0.589	0.427	0.477	0.367	0.729	0.907	2.876	0.748
AMI	0.297	0.692	0.647	0.461	0.667	0.517	0.726	0.852	2.755	0.728

Table 32 depicts the prediction RMSE results when THR=0.25 and the mean-centered function is used.

TABLE 32. RMSE RESULTS WHEN THR=0.25 AND THE MEAN-CENTERED FUNCTION IS USED

<b>RMSE (THR=0.25 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.593	1.077	0.998	0.737	1.127	0.937	0.972	1.168	3.746	1.029
<b>EUCL</b>	0.599	1.073	0.993	0.729	1.138	0.939	0.955	1.143	3.753	1.016
<b>CHEB</b>	0.599	1.067	0.985	0.723	1.138	0.935	0.944	1.13	3.752	1.007
<b>PCC</b>	0.613	1.071	0.986	0.726	1.131	0.925	0.997	1.134	3.73	1.015
<b>CPCC</b>	0.599	1.049	0.968	0.716	1.14	0.937	0.962	1.116	3.566	1.006
<b>SPCC</b>	0.609	1.066	0.981	0.722	1.122	0.915	0.995	1.134	3.721	1.012
<b>COS</b>	0.604	1.056	0.976	0.72	1.162	0.946	0.977	1.114	3.892	1.019
<b>ACOS</b>	0.595	1.063	0.981	0.718	1.088	0.897	0.973	1.163	3.614	1.014
<b>SP</b>	0.556	1.028	0.958	0.686	1.026	0.846	0.996	1.15	3.497	1.005
<b>TAU</b>	0.601	1.06	0.977	0.72	1.15	0.938	0.992	1.123	3.574	1.015
<b>MSD</b>	0.602	1.051	0.972	0.719	1.153	0.943	0.969	1.111	3.577	1.012
<b>NSM</b>	0.604	1.054	0.973	0.72	1.16	0.945	0.975	1.113	4.026	1.015
<b>ARI</b>	0.575	1.049	0.967	0.699	0.965	0.781	1.04	1.229	4.029	1.053
<b>AMI</b>	0.6	1.083	1.001	0.731	1.153	0.933	1.016	1.144	3.766	1.03

Table 33 depicts the prediction F1-measure results when THR=0.25 and the mean-centered function is used.

TABLE 33. F1-MEASURE RESULTS WHEN THR=0.25 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.25 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.966	0.884	0.892	0.936	0.897	0.926	0.870	0.816	0.224	0.879
<b>EUCL</b>	0.966	0.883	0.892	0.936	0.893	0.925	0.872	0.817	0.242	0.880
<b>CHEB</b>	0.966	0.883	0.893	0.937	0.893	0.925	0.870	0.819	0.247	0.881
<b>PCC</b>	0.963	0.881	0.892	0.936	0.894	0.927	0.859	0.816	0.171	0.877
<b>CPCC</b>	0.966	0.886	0.896	0.938	0.892	0.924	0.868	0.823	0.190	0.881
<b>SPCC</b>	0.963	0.882	0.893	0.937	0.896	0.929	0.860	0.816	0.172	0.877
<b>COS</b>	0.965	0.882	0.893	0.937	0.885	0.922	0.861	0.821	0.190	0.879
<b>ACOS</b>	0.966	0.887	0.895	0.939	0.905	0.933	0.865	0.813	0.222	0.881
<b>SP</b>	0.971	0.894	0.900	0.945	0.916	0.940	0.865	0.808	0.121	0.880
<b>TAU</b>	0.965	0.883	0.894	0.937	0.889	0.923	0.858	0.820	0.106	0.880
<b>MSD</b>	0.965	0.884	0.894	0.937	0.887	0.922	0.863	0.822	0.140	0.880
<b>NSM</b>	0.965	0.883	0.894	0.937	0.886	0.922	0.862	0.821	0.230	0.880
<b>ARI</b>	0.968	0.891	0.898	0.942	0.926	0.949	0.838	0.792	0.208	0.868
<b>AMI</b>	0.965	0.878	0.888	0.936	0.889	0.925	0.852	0.812	0.159	0.877

As far as the prediction coverage when THR=0.25 is concerned, it is the exact same, when the weighted sum prediction function was used (TABLE 23).

Table 34 depicts the prediction MAE results when THR=0.5 and the mean-centered function is used. When THR=0.5, the Jaccard Index presents a very low prediction coverage (~1.6% on average), where the rating prediction results are unreliable and hence it does not take part in the accuracy results.

TABLE 34. MAE RESULTS WHEN THR=0.5 AND THE MEAN-CENTERED FUNCTION IS USED

<b>MAE (THR=0.5 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.267	0.634	0.582	0.454	0.539	0.431	0.684	0.898	2.491	0.744
<b>EUCL</b>	0.267	0.634	0.582	0.454	0.539	0.431	0.684	0.898	2.491	0.744
<b>CHEB</b>	0.267	0.634	0.582	0.454	0.539	0.431	0.684	0.898	2.491	0.744
<b>PCC</b>	0.304	0.679	0.633	0.459	0.628	0.493	0.709	0.853	2.722	0.725
<b>CPCC</b>	0.296	0.663	0.625	0.452	0.65	0.533	0.672	0.829	2.494	0.71
<b>SPCC</b>	0.295	0.663	0.62	0.45	0.599	0.471	0.691	0.856	2.687	0.722
<b>COS</b>	0.304	0.683	0.64	0.458	0.692	0.551	0.692	0.83	3.05	0.722
<b>ACOS</b>	0.288	0.659	0.618	0.45	0.582	0.462	0.695	0.875	2.524	0.722
<b>SP</b>	0.252	0.61	0.582	0.412	0.492	0.41	0.654	0.864	2.364	0.71
<b>TAU</b>	0.301	0.682	0.637	0.457	0.664	0.534	0.7	0.841	2.619	0.721
<b>MSD</b>	0.3	0.672	0.634	0.455	0.671	0.542	0.683	0.825	2.595	0.715
<b>NSM</b>	0.302	0.677	0.635	0.457	0.683	0.547	0.687	0.826	3.178	0.718
<b>ARI</b>	0.259	0.623	0.571	0.431	0.396	0.286	0.765	0.934	2.956	0.761
<b>AMI</b>	0.295	0.701	0.657	0.469	0.654	0.504	0.721	0.868	2.744	0.735

Table 35 depicts the prediction RMSE results when THR=0.5 and the mean-centered function is used.

TABLE 35. RMSE RESULTS WHEN THR=0.5 AND THE MEAN-CENTERED FUNCTION IS USED

<b>RMSE (THR=0.5 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	-	-	-	-	-	-	-	-	-	-
<b>MANH</b>	0.558	1.052	0.96	0.725	1.029	0.858	0.964	1.241	3.674	1.057
<b>EUCL</b>	0.558	1.052	0.96	0.725	1.029	0.858	0.964	1.241	3.674	1.057
<b>CHEB</b>	0.558	1.052	0.96	0.725	1.029	0.858	0.964	1.241	3.674	1.057
<b>PCC</b>	0.608	1.076	0.994	0.729	1.115	0.909	0.992	1.154	3.774	1.023
<b>CPCC</b>	0.593	1.044	0.967	0.713	1.124	0.93	0.957	1.121	3.545	1.002
<b>SPCC</b>	0.596	1.063	0.984	0.72	1.087	0.891	0.984	1.162	3.774	1.021
<b>COS</b>	0.604	1.056	0.976	0.72	1.162	0.946	0.977	1.113	4.023	1.018
<b>ACOS</b>	0.59	1.066	0.984	0.72	1.072	0.888	0.989	1.186	3.635	1.023
<b>SP</b>	0.542	1.016	0.948	0.676	0.97	0.814	0.92	1.178	3.444	1.01
<b>TAU</b>	0.599	1.064	0.981	0.72	1.139	0.933	0.991	1.133	3.57	1.016
<b>MSD</b>	0.599	1.048	0.971	0.717	1.143	0.937	0.966	1.111	3.569	1.009
<b>NSM</b>	0.602	1.05	0.971	0.719	1.155	0.943	0.971	1.111	4.207	1.013
<b>ARI</b>	0.563	1.046	0.957	0.704	0.871	0.685	1.103	1.267	4.173	1.072
<b>AMI</b>	0.597	1.101	1.02	0.742	1.144	0.925	1.017	1.165	3.773	1.04

Table 36 depicts the prediction F1-measure results when THR=0.5 and the mean-centered function is used.

TABLE 36. F1-MEASURE RESULTS WHEN THR=0.5 AND THE MEAN-CENTERED FUNCTION IS USED

<b>F1-measure (THR=0.5 &amp; mean- centered)</b>	<b>Digital_music</b>	<b>Videogames</b>	<b>Movies</b>	<b>Kindle</b>	<b>Cell_phones</b>	<b>Musical Instruments</b>	<b>Ciao</b>	<b>Epinions</b>	<b>Book- crossing</b>	<b>Yahoo- Movies</b>
<b>JACC</b>	0.971	0.895	0.900	0.940	0.918	0.940	0.881	0.812	0.205	0.877
<b>MANH</b>	0.971	0.895	0.900	0.940	0.918	0.940	0.881	0.812	0.205	0.877
<b>EUCL</b>	0.971	0.895	0.900	0.940	0.918	0.940	0.881	0.812	0.205	0.877
<b>CHEB</b>	0.964	0.881	0.890	0.936	0.898	0.930	0.862	0.813	0.294	0.877
<b>PCC</b>	0.966	0.888	0.897	0.939	0.895	0.925	0.873	0.824	0.267	0.882
<b>CPCC</b>	0.965	0.885	0.893	0.938	0.904	0.933	0.869	0.811	0.291	0.877
<b>SPCC</b>	0.965	0.882	0.893	0.937	0.885	0.922	0.861	0.821	0.330	0.879
<b>COS</b>	0.967	0.888	0.895	0.939	0.908	0.935	0.866	0.810	0.303	0.881
<b>ACOS</b>	0.973	0.899	0.902	0.947	0.927	0.945	0.883	0.804	0.250	0.880
<b>SP</b>	0.966	0.883	0.893	0.938	0.892	0.924	0.861	0.818	0.260	0.880
<b>TAU</b>	0.966	0.885	0.895	0.938	0.890	0.923	0.864	0.822	0.264	0.880
<b>MSD</b>	0.965	0.884	0.895	0.937	0.887	0.923	0.864	0.822	0.364	0.880
<b>NSM</b>	0.969	0.892	0.898	0.942	0.939	0.960	0.836	0.786	0.289	0.865
<b>ARI</b>	0.966	0.875	0.884	0.934	0.891	0.927	0.855	0.808	0.280	0.876
<b>AMI</b>	0.971	0.895	0.900	0.940	0.918	0.940	0.881	0.812	0.205	0.877

As far as the prediction coverage when THR=0.5 is concerned, it is the exact same, when the weighted sum prediction function was used (TABLE 27)

### **3. Conclusions**

In this report we have presented the experimental findings from applying 15 user similarity metrics in 10 sparse CF datasets. Furthermore, we used 2 NNs selection methods and 2 rating prediction formulation equations.

## 4. References

- [1] Fkih, F. (2022). Similarity measures for Collaborative Filtering-based Recommender Systems: Review and experimental comparison. *Journal of King Saud University-Computer and Information Sciences*, 34(9), 7645-7669.
- [2] Al-Shamri, M. (2022). Similarity Measures for Recommender Systems: Drawbacks and Neighbors Formation.
- [3] Jain, G., Mahara, T., & Tripathi, K. N. (2020). A survey of similarity measures for collaborative filtering-based recommender system. In *Soft Computing: Theories and Applications: Proceedings of SoCTA 2018* (pp. 343-352). Springer Singapore.
- [4] Stephen, S. C., Xie, H., & Rai, S. (2017, July). Measures of similarity in memory-based collaborative filtering recommender system: A comparison. In *Proceedings of the 4th multidisciplinary international social networks conference* (pp. 1-8).
- [5] Shardanand, U., & Maes, P. (1995, May). Social information filtering: Algorithms for automating “word of mouth”. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 210-217).
- [6] Resnick, P., Iacovou, N., Suchak, M., Bergstrom, P., & Riedl, J. (1994, October). Grouplens: An open architecture for collaborative filtering of netnews. In *Proceedings of the 1994 ACM conference on Computer supported cooperative work* (pp. 175-186).
- [7] Sarwar, B., Karypis, G., Konstan, J., & Riedl, J. (2001, April). Item-based collaborative filtering recommendation algorithms. In *Proceedings of the 10th international conference on World Wide Web* (pp. 285-295).
- [8] Aggarwal, C. C. (2016). *Recommender systems* (Vol. 1). Cham: Springer International Publishing.
- [9] R4 - Yahoo! Movies User Ratings and Descriptive Content Information, v.1.0. Available online: <https://webscope.sandbox.yahoo.com/catalog.php?datatype=r> (accessed on 11 December 2023).
- [10] Book-Crossing Dataset. Available online: <https://www.kaggle.com/datasets/somnambwl/bookcrossing-dataset> (accessed on 11 December 2023).
- [11] Amazon Review Data (2018). Available online: <https://nijianmo.github.io/amazon/index.html> (accessed on 11 December 2023).
- [12] Epinions (trust network). Available online: <https://www.kaggle.com/datasets/masoud3/epinions-trust-network> (accessed on 11 December 2023).
- [13] CiaoDVD dataset. Available online: <https://guoguibing.github.io/librec/datasets.html> (accessed on 11 December 2023).