

Multi - purpose Library of Recommender System Algorithms for the Item Prediction Task

Julius Kolbe

11.6.2013

Contents

1	Abstract	4
2	Introduction	5
2.1	Motivation	5
2.2	Task (what a Recommender System does)	5
2.3	Objective and Motivation	5
3	3 Related Work	6
3.1	MyMediaLite	6
3.2	PREA	6
3.3	3.3 Mahout	6
3.4	Duine	6
3.5	Cofi	6
3.6	Lenskit	6
4	Recommendation Algorithms	7
4.1	Primitive Algorithms	7
4.2	k-Nearest-Neighbor	7
4.3	Matrix Factorization	7
4.3.1	BPRMF	7
4.3.2	RankMFX	7
4.3.3	Ranking SVD (Sparse SVD)	7
4.4	Evaluation Methods	7
4.4.1	Leave-one-out Protocol	7
4.5	Evaluation metrics	7
4.5.1	Hitrate/Recall	7
4.5.2	Precision	7
4.5.3	F1	7
4.5.4	Mean Reciprocal Hitrate	7
4.5.5	Area under the ROC	7
5	Datasets for testing	8
5.1	MovieLens	8
5.2	Million Song Dataset	8
5.3	SNAP	8

6	Experiments	9
6.1	Execution	9
6.2	Results	9
6.3	Comparison	9
7	Design and Implementation	10
7.1	General structure	10
7.2	Interfaces	10
8	User Manual	11
8.1	Primitive Algorithms	11
8.2	k-Nearest Neighbor	11
8.3	BPRMF	11
8.4	RankMFX	11
8.5	Ranking SVD (Sparse SVD)	11
9	Conclusions	12
9.1	Future work	12
9.2	Outlook	12
10	References	13

1 Abstract

2 Introduction

2.1 Motivation

2.2 Task (what a Recommender System does)

2.3 Objective and Motivation

3 3 Related Work

3.1 MyMediaLite

3.2 PREA

3.3 3.3 Mahout

3.4 Duine

3.5 Cofi

3.6 Lenskit

4 Recommendation Algorithms

4.1 Primitive Algorithms

4.2 k-Nearest-Neighbor

4.3 Matrix Factorization

4.3.1 BPRMF

4.3.2 RankMFX

4.3.3 Ranking SVD (Sparse SVD)

4.4 Evaluation Methods

4.4.1 Leave-one-out Protocol

4.5 Evaluation metrics

4.5.1 Hitrate/Recall

4.5.2 Precision

4.5.3 F1

4.5.4 Mean Reciprocal Hitrate

4.5.5 Area under the ROC

5 Datasets for testing

5.1 MovieLens

5.2 Million Song Dataset

5.3 SNAP

6 Experiments

6.1 Execution

6.2 Results

6.3 Comparison

7 Design and Implementation

7.1 General structure

7.2 Interfaces

8 User Manual

8.1 Primitive Algorithms

8.2 k-Nearest Neighbor

8.3 BPRMF

8.4 RankMFX

8.5 Ranking SVD (Sparse SVD)

9 Conclusions

9.1 Future work

9.2 Outlook

10 References