

Contents

Part I Foundations

1	Social Tagging Systems	3
1.1	Introduction	3
1.2	Folksonomies	4
1.3	Tag Clouds	5
1.4	Data Representation	5
1.4.1	Folksonomies as Tensors	6
1.4.2	Folksonomies as Hypergraphs	6
1.5	Recommendation Tasks in STS	7
1.5.1	User Recommendation	8
1.5.2	Resource Recommendation	9
1.5.3	Tag Recommendation	9
1.6	Recommendations in Social Tagging Systems	10
1.6.1	BibSonomy	10
1.6.2	CiteULike	11
1.6.3	Other Systems	12
1.7	Notation	13
1.8	Further Reading	14
	References	14
2	Recommender Systems	17
2.1	Rating and Item Prediction	17
2.2	Rating Prediction as Regression Problem	18
2.3	Item Prediction as Ranking Problem	21
2.4	User and Item Attributes	23
2.5	New User and New Item Problems	24
2.6	Context-aware and Multi-Mode Recommendations	25
	References	27

Part II Recommendation Techniques for Social Tagging Systems

3	Baseline Techniques	33
3.1	Constant Models	33
3.1.1	Tag Recommendation	33
3.1.2	User/Tag-aware Recommendation	34
3.1.3	Remarks on Complexity	34
3.2	Projection Matrices	35
3.3	Projection-based Collaborative Filtering	36
3.3.1	Tag Recommendations	36
3.3.2	Tag-aware Recommendations	37
3.3.3	User Recommendations	38
3.3.4	Remarks on Complexity	39
3.4	Further Reading	39
	References	41
4	Advanced Techniques	43
4.1	Factorization Models	43
4.1.1	Higher Order Singular Value Decomposition – HOSVD on Tensors	44
4.1.2	Scalable Factorization Models	51
4.1.3	Learning Tag Recommendation Models	55
4.2	Graph-based Models	57
4.2.1	PageRank-based Recommendations in STS	57
4.2.2	Relational Neighbors for Tag Recommendations	60
4.3	Content and Social-Based Models	63
4.3.1	Exploiting the Content of Resources	63
4.3.2	Exploiting Social Relations	65
4.4	Further Reading	69
	References	70
5	Offline Evaluation	75
5.1	Evaluation Metrics	75
5.1.1	Precision and Recall	75
5.1.2	Further Measures	76
5.2	Evaluation Protocols	76
5.2.1	LeavePostOut Methodology	76
5.2.2	Time-based Splits	77
5.3	Comparison of Tag Recommenders	77
	References	79

Part III Implementing Recommender Systems for Social Tagging

6	Real World Social Tagging Recommender Systems	83
6.1	Introduction	83
6.2	Challenges and Requirements	85

- 6.3 The BibSonomy Social Tagging System..... 86
- 6.4 Architecture 87
 - 6.4.1 Overview 87
 - 6.4.2 Recommender Interface 88
 - 6.4.3 Logging 90
- 6.5 Recommender Implementations 90
 - 6.5.1 Meta Recommender 90
 - 6.5.2 Multiplexing Tag Recommender 92
 - 6.5.3 Example Recommender Implementations 92
- 6.6 Further Reading..... 94
- References 94

- 7 Online Evaluation 97**
 - 7.1 Evaluation Setting..... 97
 - 7.1.1 Metrics and Protocols 97
 - 7.1.2 Preprocessing and Cleansing 97
 - 7.2 Case Study 98
 - 7.2.1 General Results 98
 - 7.2.2 Influence of the ‘reload’ Button 99
 - 7.2.3 Logged ‘click’ Events 101
 - 7.2.4 Average F1-Measure per User 102
 - 7.3 The ECML PKDD Discovery Challenge 2009 103
 - 7.3.1 Setting..... 104
 - 7.3.2 Methods 104
 - 7.3.3 Results..... 105
 - 7.4 Conclusion 107
 - References 108

- 8 Conclusions 109**
 - 8.1 Summary..... 109
 - 8.2 Discussion and Outlook 110
 - References 111



<http://www.springer.com/978-1-4614-1893-1>

Recommender Systems for Social Tagging Systems
Balby Marinho, L.; Hotho, A.; Jäschke, R.; Nanopoulos,
A.; Rendle, S.; Schmidt-Thieme, B.; Stumme, G.;
Symeonidis, P.
2012, IX, 111 p., Softcover
ISBN: 978-1-4614-1893-1