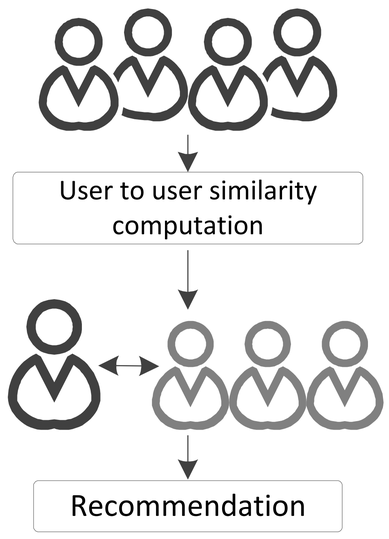
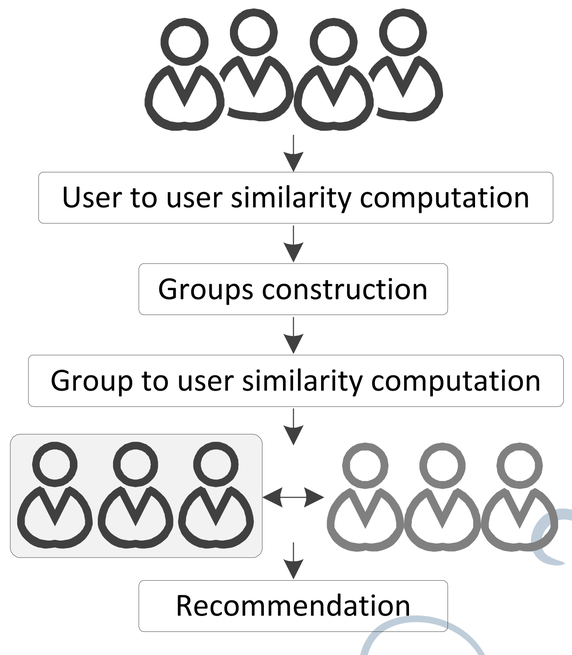
Exploring the Group Recommendation for Single-User Recommendation Tasks

Michal Kompan and Mária Bieliková

Main Idea

- Group principles used for the single-user recom.
- Virtual groups construction based on the user-to-user similarity
- Not the most similar users are in the groups
- Virtual users represent the group preferences





Evaluation

- **MovieLens 100k**
- 100 000 ratings, 943 users, 1 682 ratings
- **SME.SK**
- 17 000 visits, 1 200 users
- train 80%, test 20%, 5 fold cross validation
- P@3, P@10, MAE, RMSE

Results

- **Baseline**
- collaborative and group recommender
- **Proposed approach improvement**
- MovieLens 11.5% (t-test p=0.0018, =0.05,t=4.21)
- best (top 3, 91 users) 50%
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- SME.SK 10.01% (t- test p=0.0001, =0.05,t=29.10)
- best (top 10, 91 users) 39%

Aggregation strategies comparison

	P@3			MAE			RMSE		
Group size	AV	LM	MP	AV	LM	MP	AV	LM	MP
3	0.5733	0.5250	0.5711	0.60	0.53	0.58	0.49	0.40	0.48
4	0.5750	0.5739	0.5575	0.60	0.60	0.59	0.50	0.50	0.49
5	0.5616	0.5592	0.5588	0.61	0.60	0.60	0.50	0.50	0.50
6	0.5555	0.5538	0.5541	0.57	0.57	0.57	0.47	0.47	0.47
7	0.5397	0.5346	0.5356	0.56	0.55	0.56	0.47	0.46	0.46
Avg.	**0.5610**	0.5493	0.5554	0.59	**0.57**	0.58	0.49	**0.47**	0.48

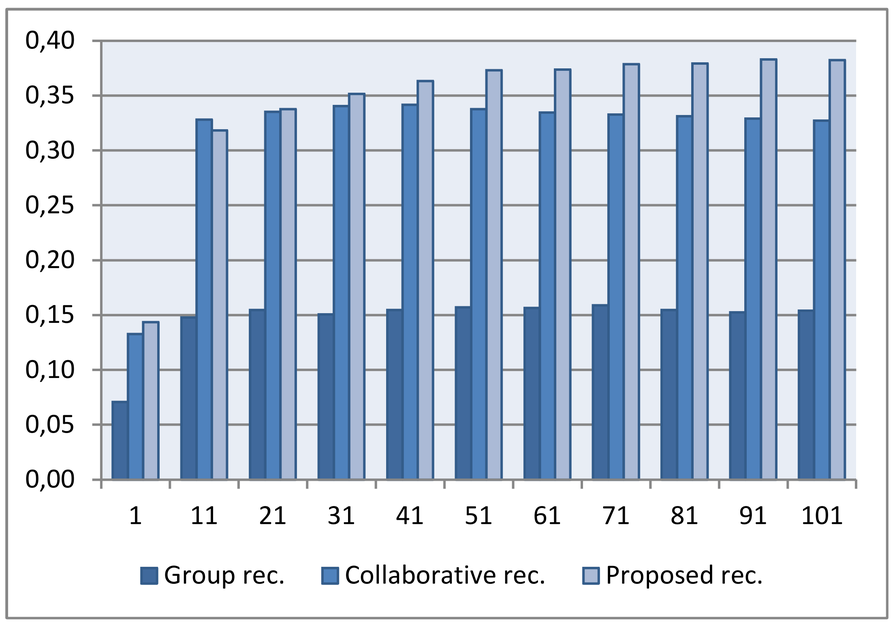
Ratings prediction accuracy

Group size	Top 3			Top 10		
	P@3	MAE	RMSE	P@10	MAE	RMSE
3	**0.4272**	0.51	0.42	**0.3251**	0.61	0.52
4	0.3927	0.48	0.40	0.3091	0.60	0.51
5	0.3948	0.48	0.40	0.3057	0.59	0.50
6	0.3929	0.48	0.39	0.3047	0.59	0.50
7	0.3829	**0.47**	**0.38**	0.2961	**0.58**	**0.49**
Avg.	**0.3981**	0.49	**0.40**	**0.3081**	**0.59**	**0.50**
Std.	0.3819	**0.48**	**0.40**	0.2780	**0.59**	0.51

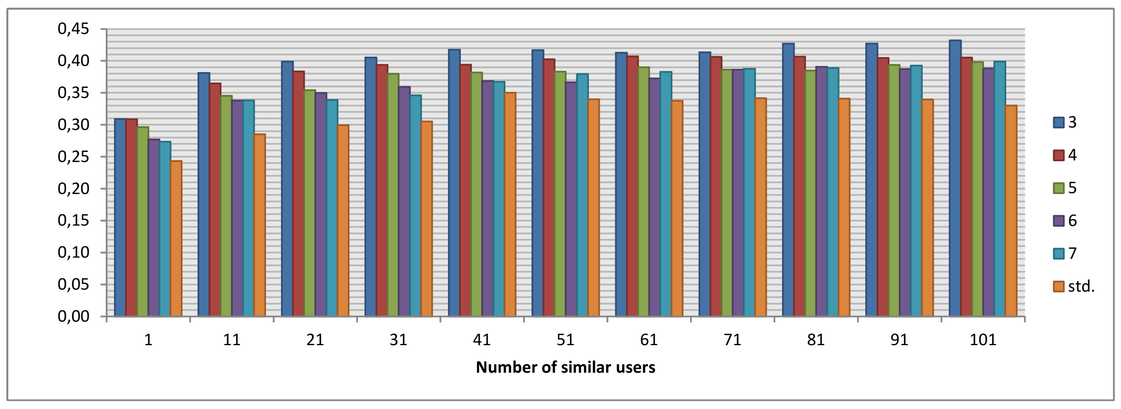
Neighborhood size impact (Precision@3)

Similar user neighbour.	Group size						
	3	4	5	6	7	Avg.	Std.
1	0.1453	0.1618	0.1408	0.1322	0.1367	0.1434	0.1327
11	0.3447	0.3165	0.3113	0.3144	0.3035	0.3181	0.3279
21	0.3760	0.3335	0.3261	0.3311	0.3210	0.3375	0.3353
31	0.3830	0.3418	0.3433	0.3478	0.3410	0.3514	0.3405
41	0.3827	0.3547	0.3645	0.3600	0.3546	0.3633	**0.3415**
51	0.3991	0.3642	0.3677	0.3729	0.3612	0.3730	0.3377
61	0.3954	0.3681	0.3727	0.3717	0.3598	0.3736	0.3344
71	0.3997	0.3695	0.3799	0.3749	0.3682	0.3784	0.3326
81	0.4051	0.3697	0.3801	0.3771	0.3635	0.3791	0.3310
91	**0.4065**	**0.3797**	**0.3827**	0.3764	0.3696	**0.3830**	0.3289
101	0.4046	0.3791	0.3813	**0.3769**	**0.3699**	0.3824	0.3271

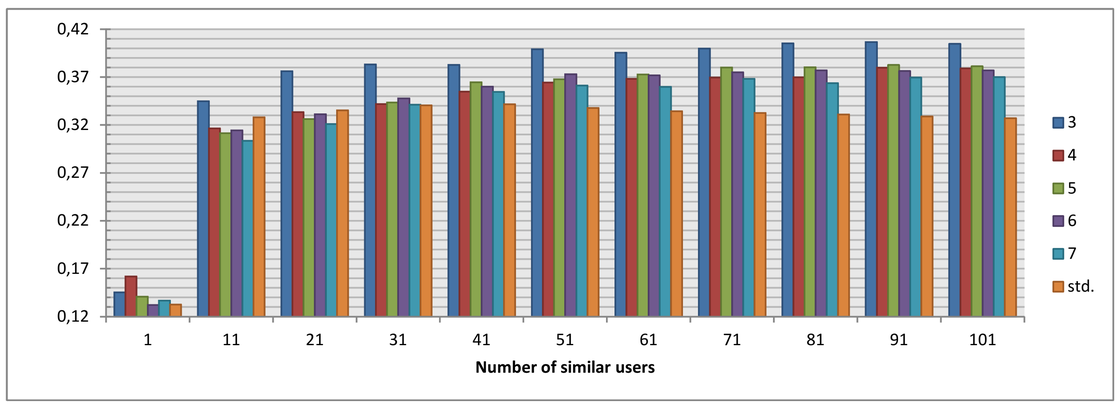
Comparison to standard approaches



Neighborhood size impact (Precision@3) - MovieLens



Neighborhood size impact (Precision@3) - SME.SK



STU FIIT
SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
FACULTY OF INFORMATICS AND INFORMATION TECHNOLOGIES

PeWe@FIIT
personalized web group

Michal Kompan
kompan@fiit.stuba.sk
Mária Bieliková
bielik@fiit.stuba.sk