UNRESYST

Universal Recommender System
30th May 2011

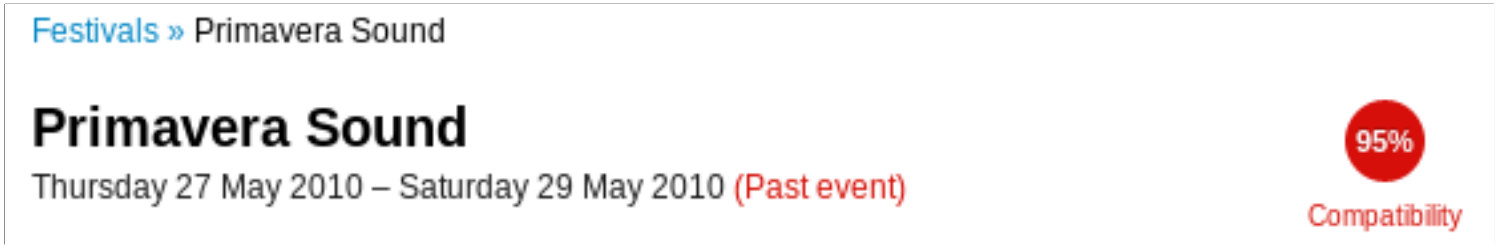
Presentation Overview

1. Quick Introduction to Recommender Systems
2. Problem Analysis
3. System Design
4. Adaptation to Datasets
5. Finale, Discussion

1. Intro
Recommenders

last.fm Google news Flixster

- User actions
  - Find items I will like
  - Sort items by preference
  - Advise me on particular item



1. Intro:
Recommenders as a Research Area

- Gathering user preference
- Algorithms transforming past user actions to recommendations
- Privacy, legacy and other aspects
- Measuring recommender efficiency
- Recommender system implementation

GroupLens Research

ACM Recommender Systems

?+?+?=!

2. Analysis: Chosen Research Areas

- Gathering user preference
- Algorithms transforming past user actions to recommendations
- Privacy, legacy and other aspects
- Measuring recommender efficiency
- Recommender system implementation

Thesis type:

- Implementace
- Výzkumný problém
- Analýza a návrh řešení zadaného problému
- Srovnávací studie

2. Analysis Requirements

Features:

- Domain Independence
- Using and combining multiple data sources
- Simple and developer-friendly interface
- Verification on various domains

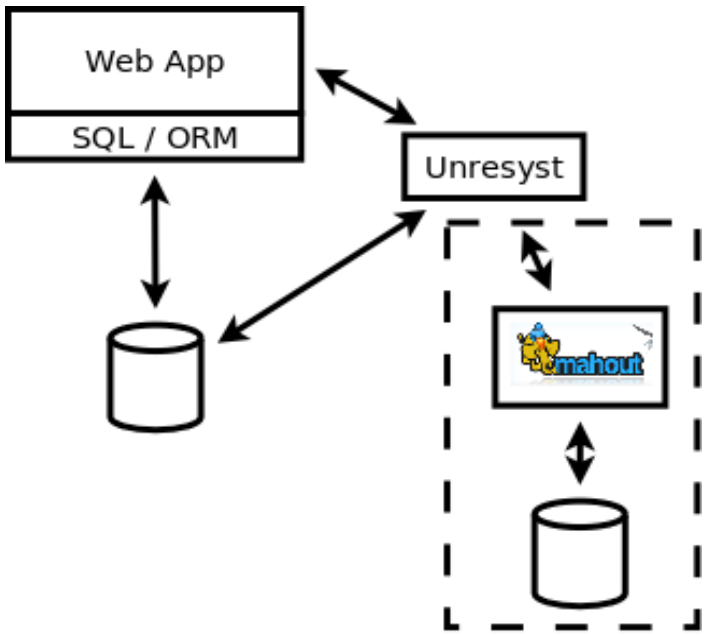
Adaptation :

- subjects, objects
- rules and relationships
- predicted relationship
- bias

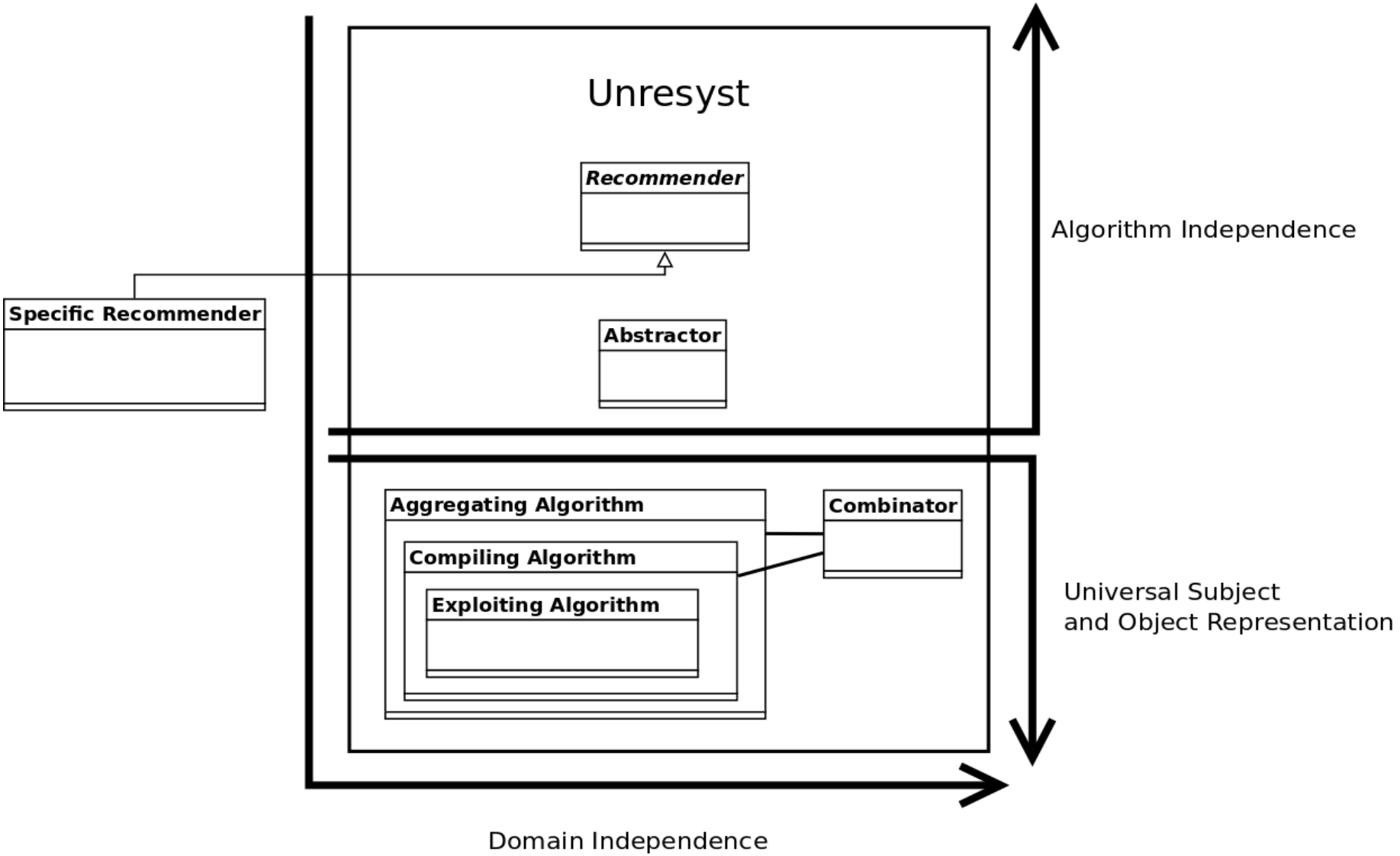
3. Design
Unresyst

Architecture concepts:

- outside the client system
- easy-to-use interface
- can share parent system DB
- can use external algorithm implementation
- needs setup



3. Design
Architecture - Layers

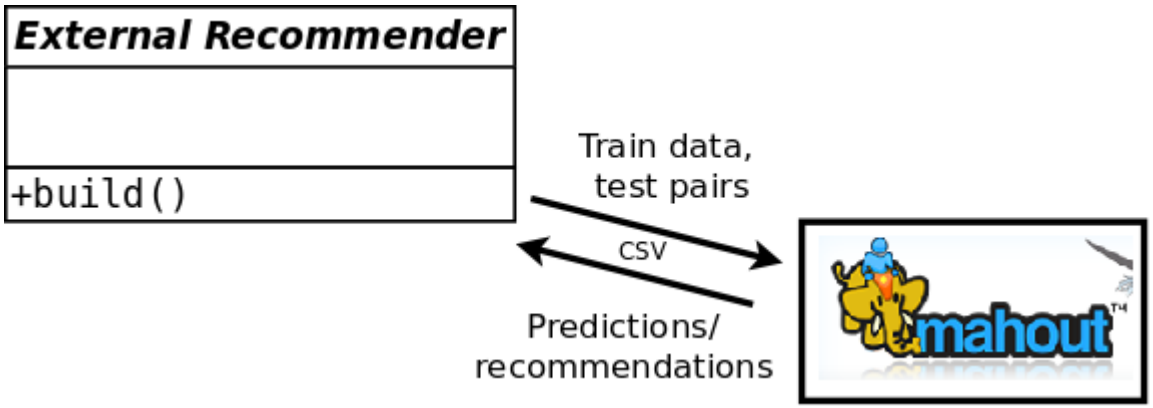


4. Adaptation to Datasets, Comparison

Offline accuracy analysis:

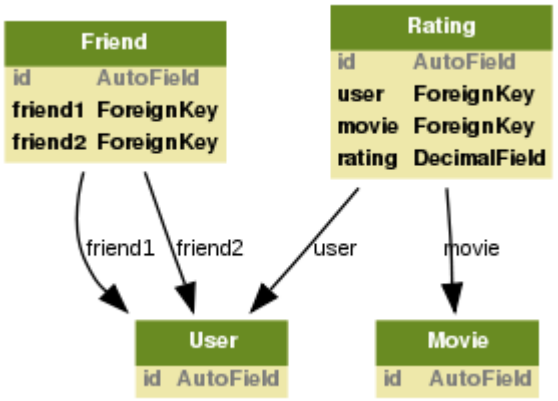
- Divide data to train and test set (timestamp).
- Run recommender on train set.
- Validate the recommendations against test set values, using RMSE and Rank metrics

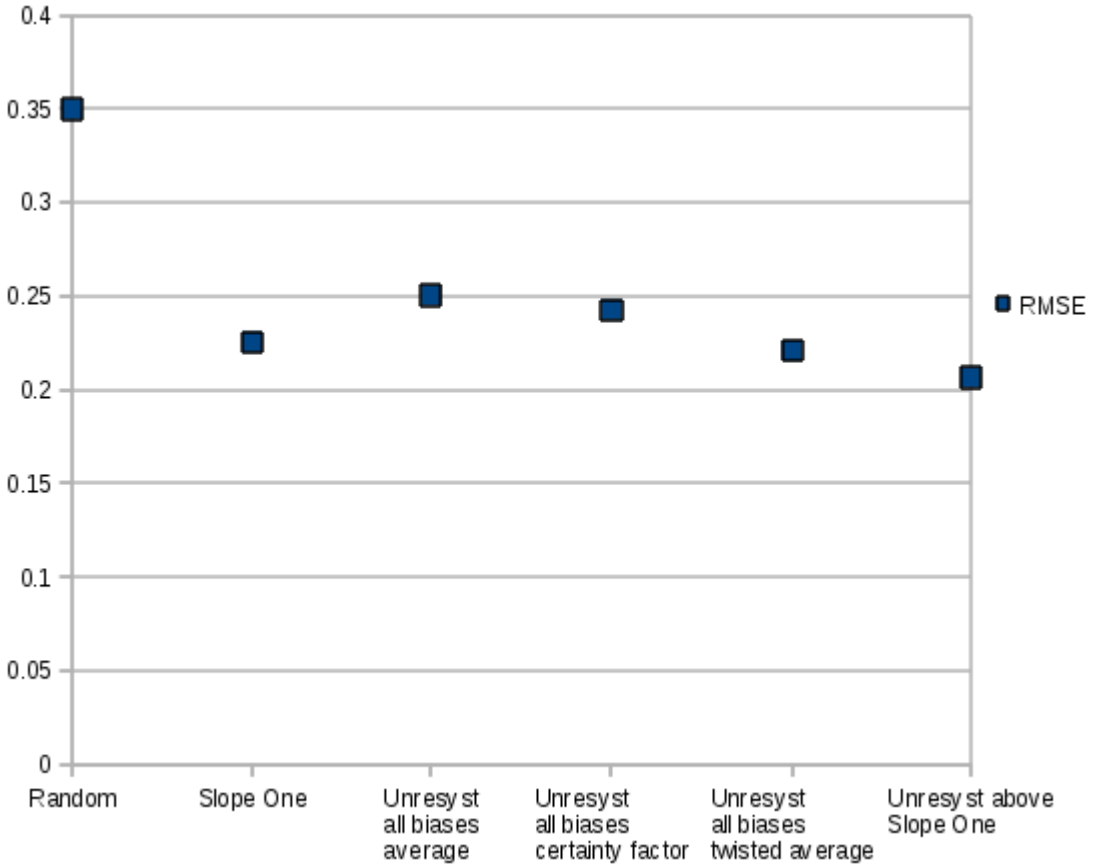
Comparison to a collaborative filtering algorithm (slope one).



4. Adaptation to Datasets, Comparison Flixster Data Set

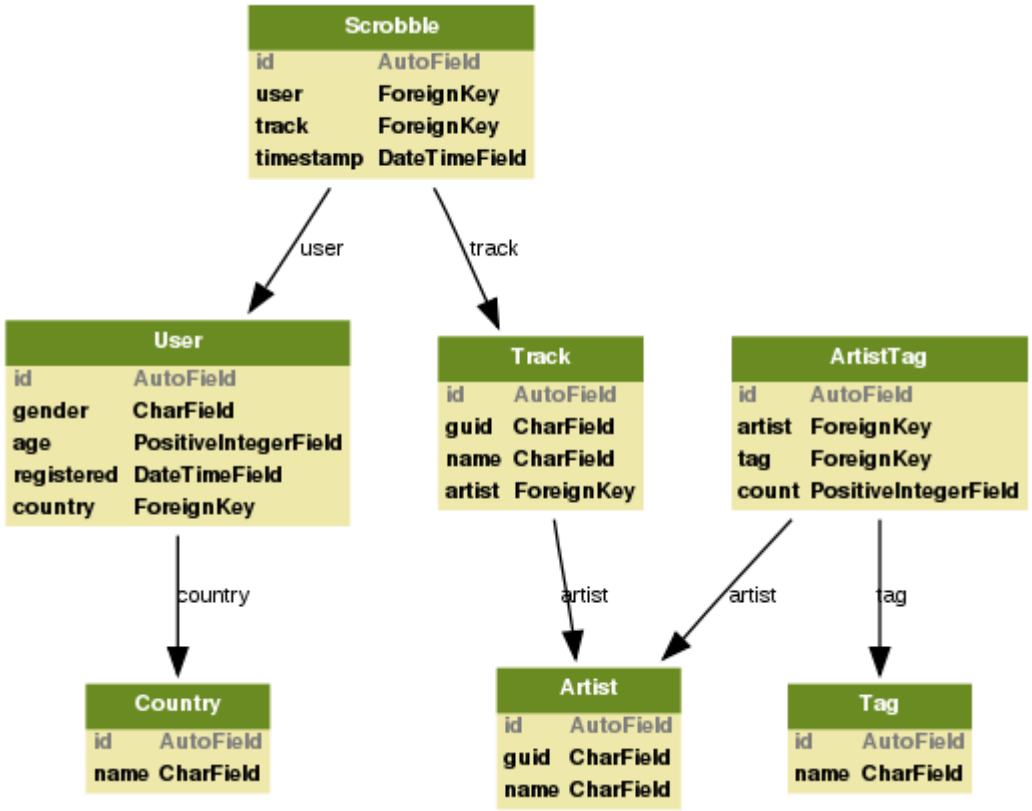
- Users rating movies
- Social links between users

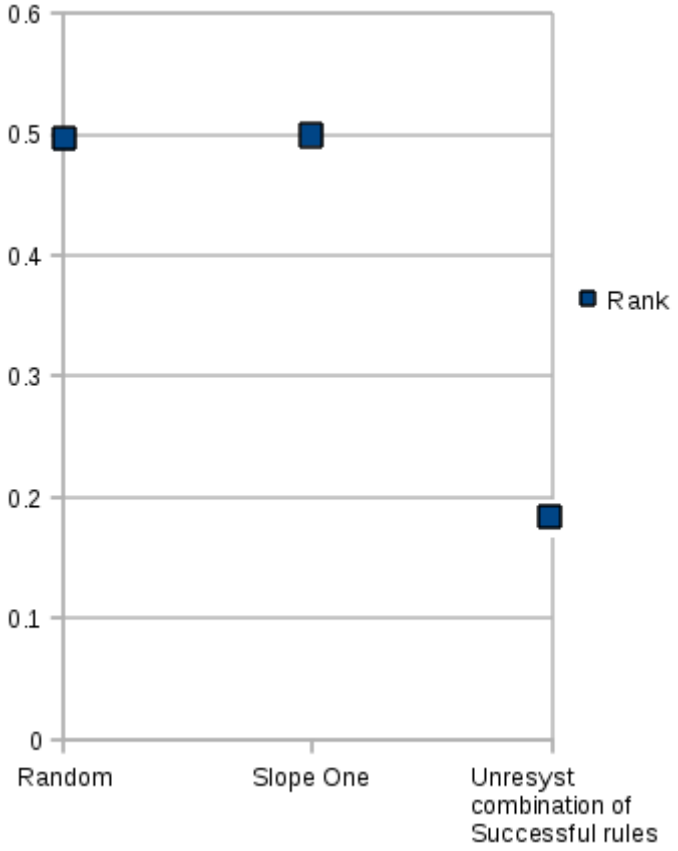




4. Adaptation to Datasets, Comparison
Last.fm Data Set

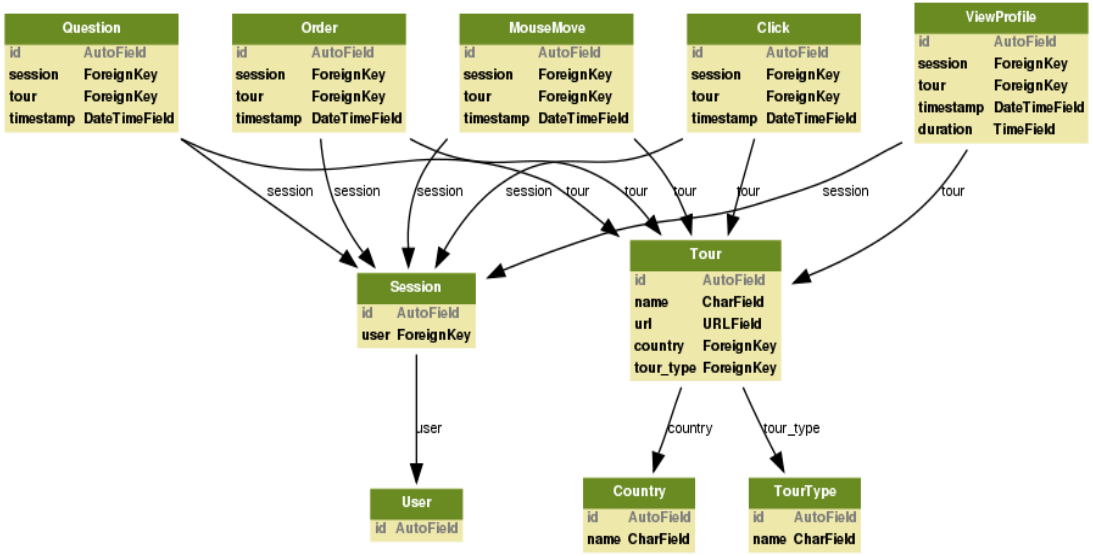
- Users listening to Tracks by Artists
- Recommending Artists to Users

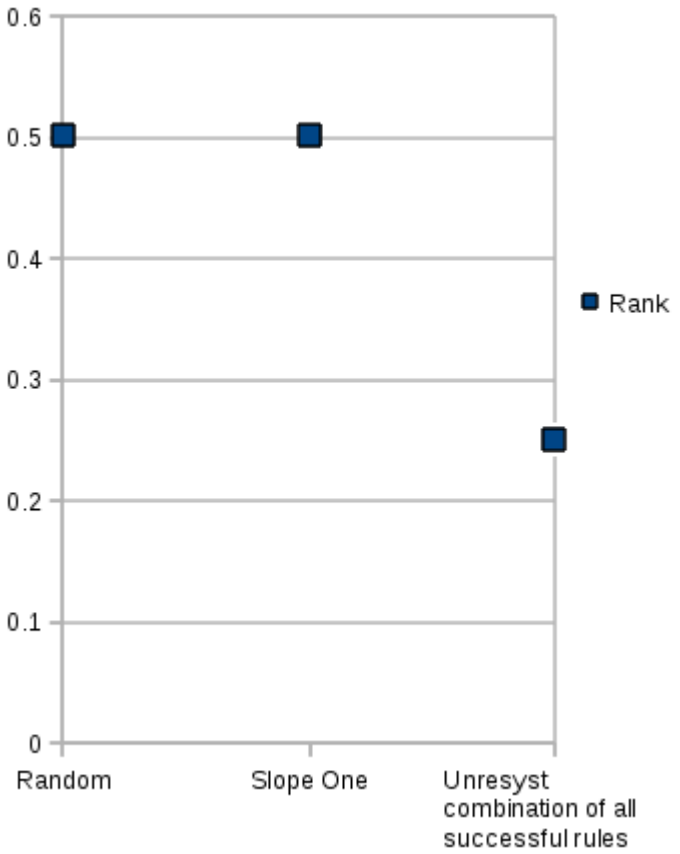




4. Adaptation to Datasets, Comparison
Travel Agency Data Set

- Users viewing and ordering tours
- Various kinds of implicit feedback



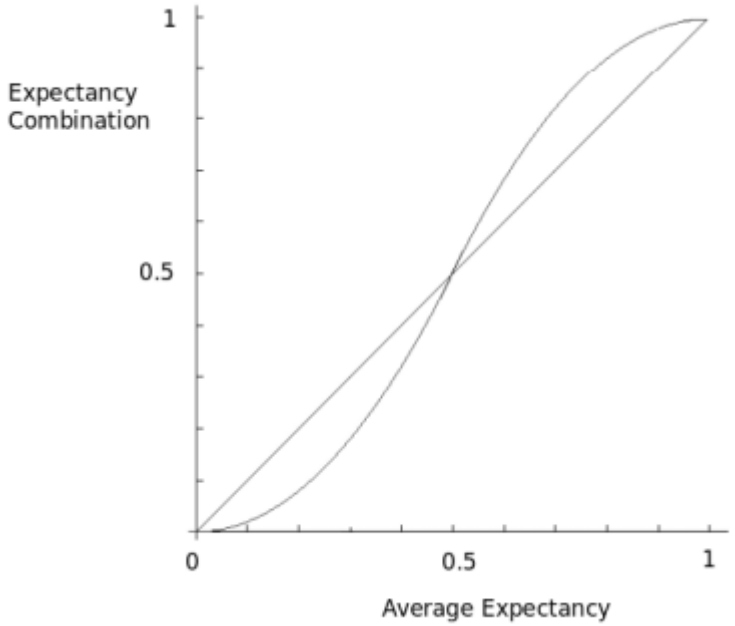


5. Finale

Thanks for your attention.

Unresyst project homepage: http://code.google.com/p/unresyst/

BACKUP
Combination – Twisted average



$$f(a) = \begin{cases} 2^n a^{n+1} & \text{if } a \in [0, \frac{1}{2}] \\ 1 - |2^n (a-1)^{n+1}| & \text{if } a \in (\frac{1}{2}, 1] \end{cases}$$

BACKUP
Combination – Mycin

$$t(x) = 2x - 1$$

$$t^{-1}(x) = \frac{x+1}{2}$$

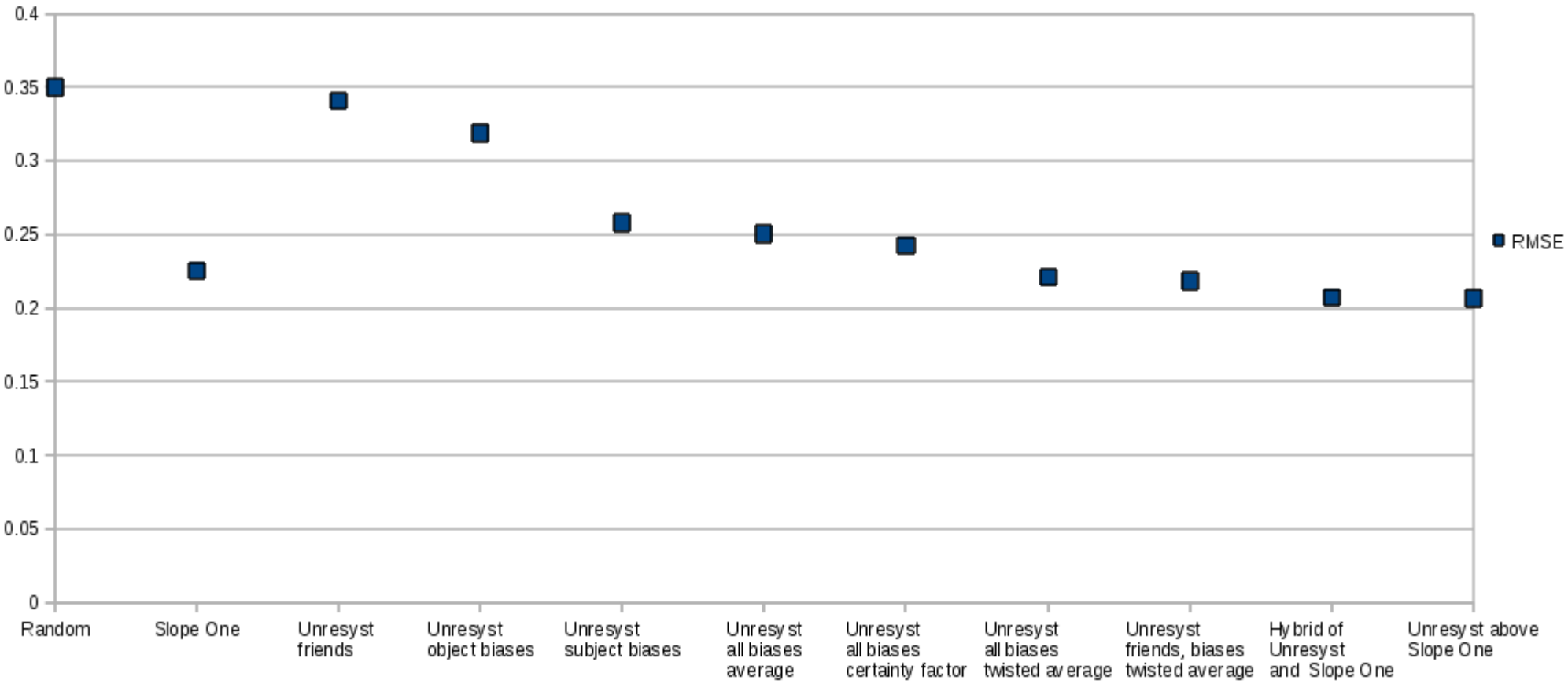
$$CFC(cf_1, cf_2) = \begin{cases} cf_1 + cf_2(1 - cf_1) & \text{if } cf_1, cf_2 > 0 \\ \frac{cf_1 \ cf_2}{1 - min(|cf_1|, |cf_2|)} & \text{if } -1 < cf_1 cf_2 \leq 0 \\ cf_1 + cf_2(1 + cf_1) & \text{if } cf_1, cf_2 < 0 \end{cases}$$

BACKUP
Measuring Efficiency – Average Rank

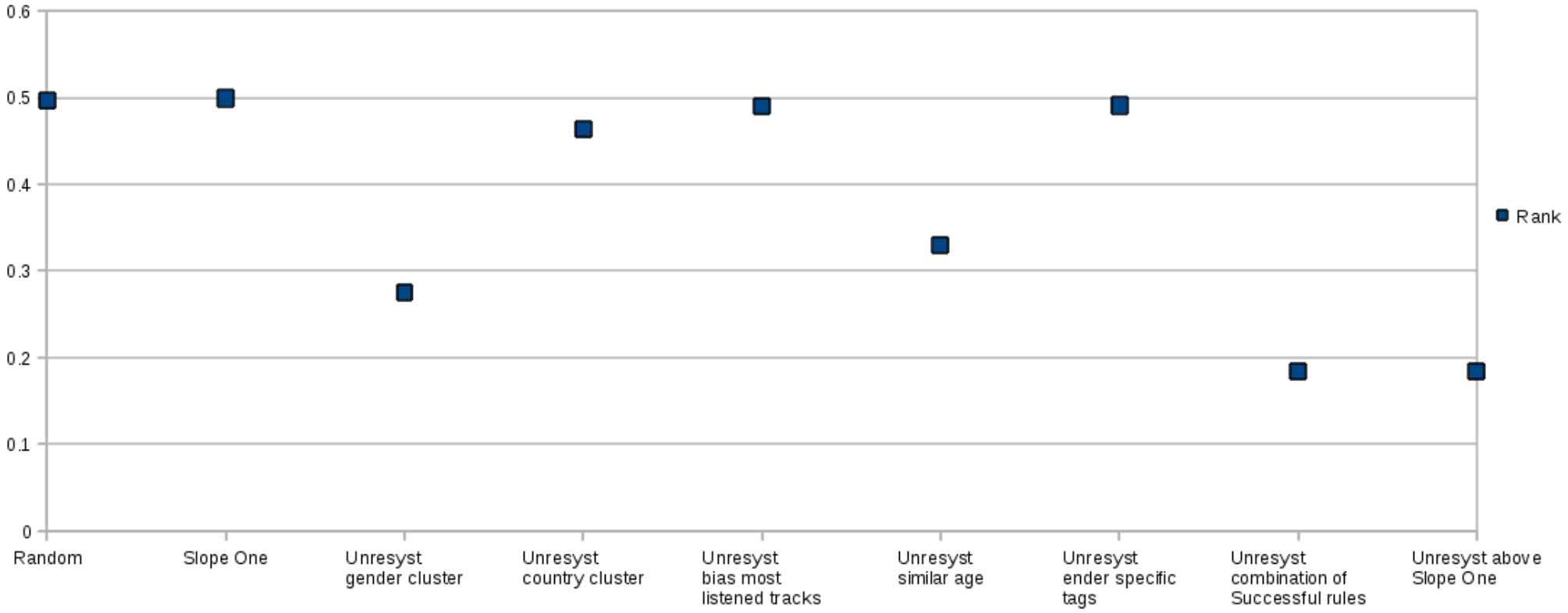
$$\overline{rank} = \frac{\sum_{(s,o)\in T} rank_{so}}{|T|}$$

$$rank_{so} = \frac{i_{so}}{m-1}$$

BACKUP
Flixster



BACKUP
Last.fm



BACKUP
Travel Agency