Workshop eliciting Adaptive Sequences for Learning (WeASeL)
UQAM, Montréal (Canada), 12 June 2018

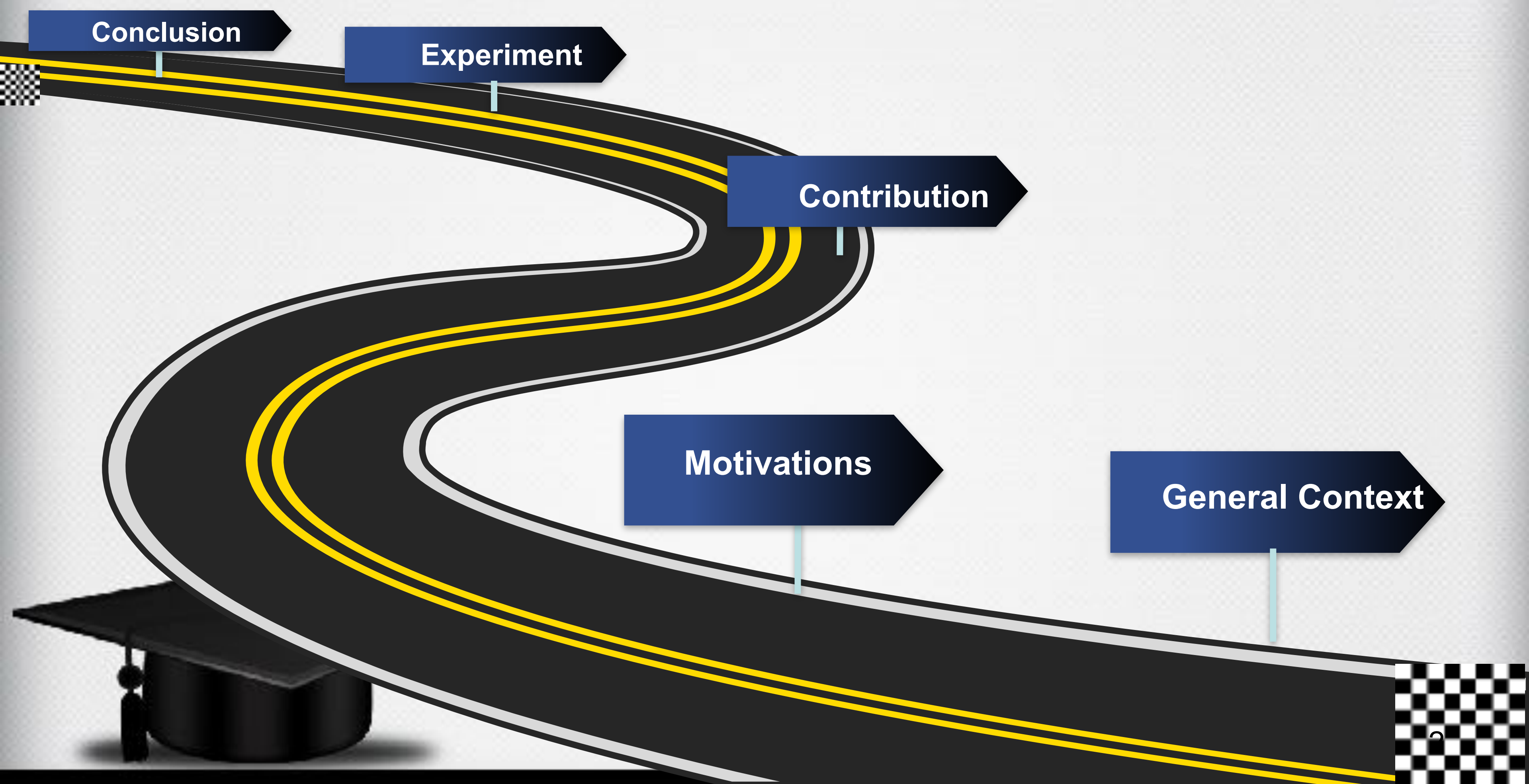
Optimizing Recommendation in Collaborative E-Learning by Exploring DBpedia and Association Rules

[1]Samia Beldjoudi
[2]Hassina Seridi

[1]Superior School of Industrial Technologies, Annaba, Algeria
[1, 2]Laboratory of Electronic Document Management LabGED Badji Mokhtar University, Annaba, Algeria
[1]s.beldjoudi@epst-annaba.dz [2]Seridi@labged.net

ITS 2018

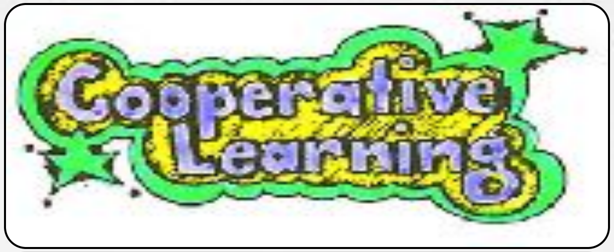
Work plan


General Context
Motivations
Contribution
Experiment
Conclusion

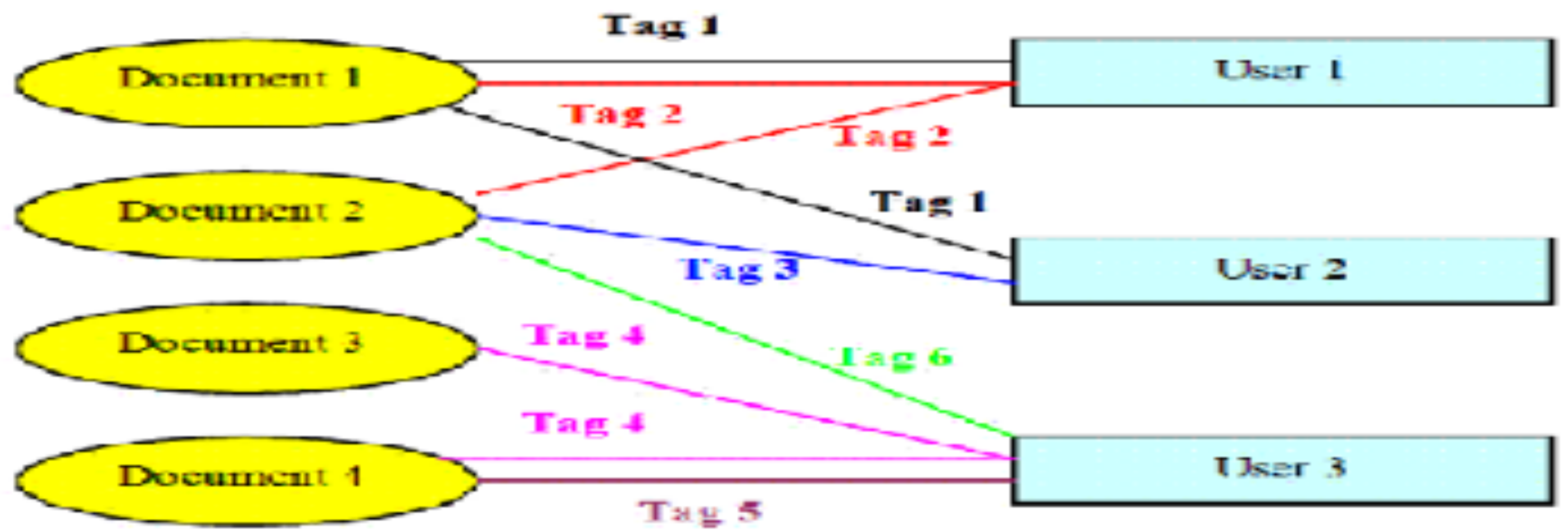
General Context: Social Web

Is a set of social relations that link people through the World Wide Web

General Context: Collaborative E-learning



General Context: Folksonomies



Indexing systems produced within internet communities

General Context:

Recommendation and Collaborative E-learning

suggest items: movies, music or products by analyzing what the users with similar tastes have chosen in the past

Issues in Folksonomies

- Tag ambiguity (Polysemy: many sense):

Apple

Example

Recommender system issue: Diversity and Novelty

- Accuracy vs Diversity and Novelty in Recommendation:

Linked Open Data (LOD)

Linked data + Public & under an open license. = Linked Open Data

Research Question

How using LOD to improve recommendation when searching personalized and relevant resources within social E-learning applications?

Main Contributions

Contribution

Reduce tag ambiguity problem in recommendation

Using LOD to ensure diversity and novelty in recommendation

Approach description

- Formally:

a folksonomy is a tuple **F = <L, T, R, A>**

L : learners

T : tags

R : resources

A : the relationships between the three preceding elements, i.e. $A \subseteq U \times T \times R$

Approach description

➔ Extacting 3 Social networks:

✓ network relating tags and users,

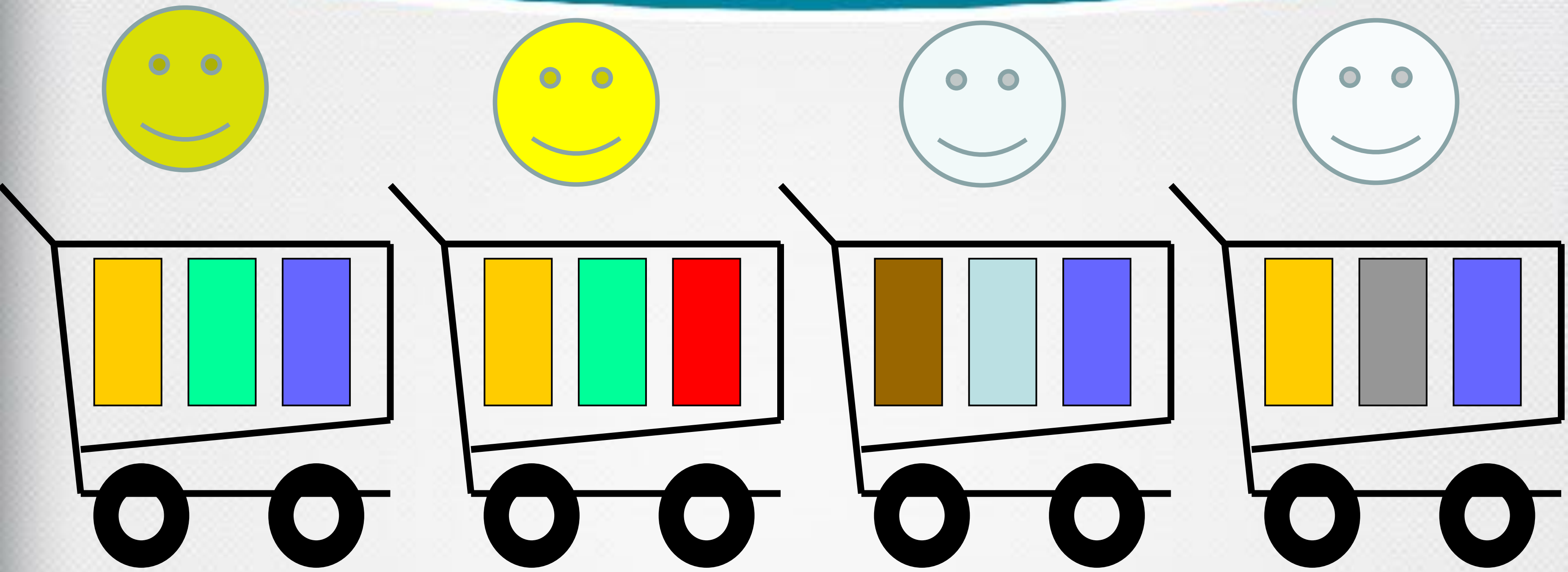
✓ network relating tags and resources

✓ network relating users and resources.

➔ We represent these social networks by three matrices LT, RT, RL:

- LT = $[X_{ij}]$ where : $X_{ij} = \begin{cases} 1 \text{ if } \exists\, r \in R, < uj, ti, r > \in A \\ 0 \text{ otherwise} \end{cases}$
- RT = $[Y_{ij}]$ where: $Y_{ij} = \begin{cases} 1 \text{ if } \exists\, u \in U, < u, ti, rj > \in A \\ 0 \text{ otherwise} \end{cases}$
- RL = $[Z_{ij}]$ where: $Z_{ij} = \begin{cases} 1 \text{ if } \exists\, t \in T, < ui, t, rj > \in A \\ 0 \text{ otherwise} \end{cases}$

Association Rules



Associations Rules and Folksonomies

Transaction-id → Learner

Transaction items → tags used by the learner

Learner (transaction-id)	Tags (itemsets)
L1	Software,…………………………, Java
L2	Software, …………………………
L3	Java, ………………………,Software
L4	……………..,Java
L5	Java,…………………………,Software

Software ⇒ Java

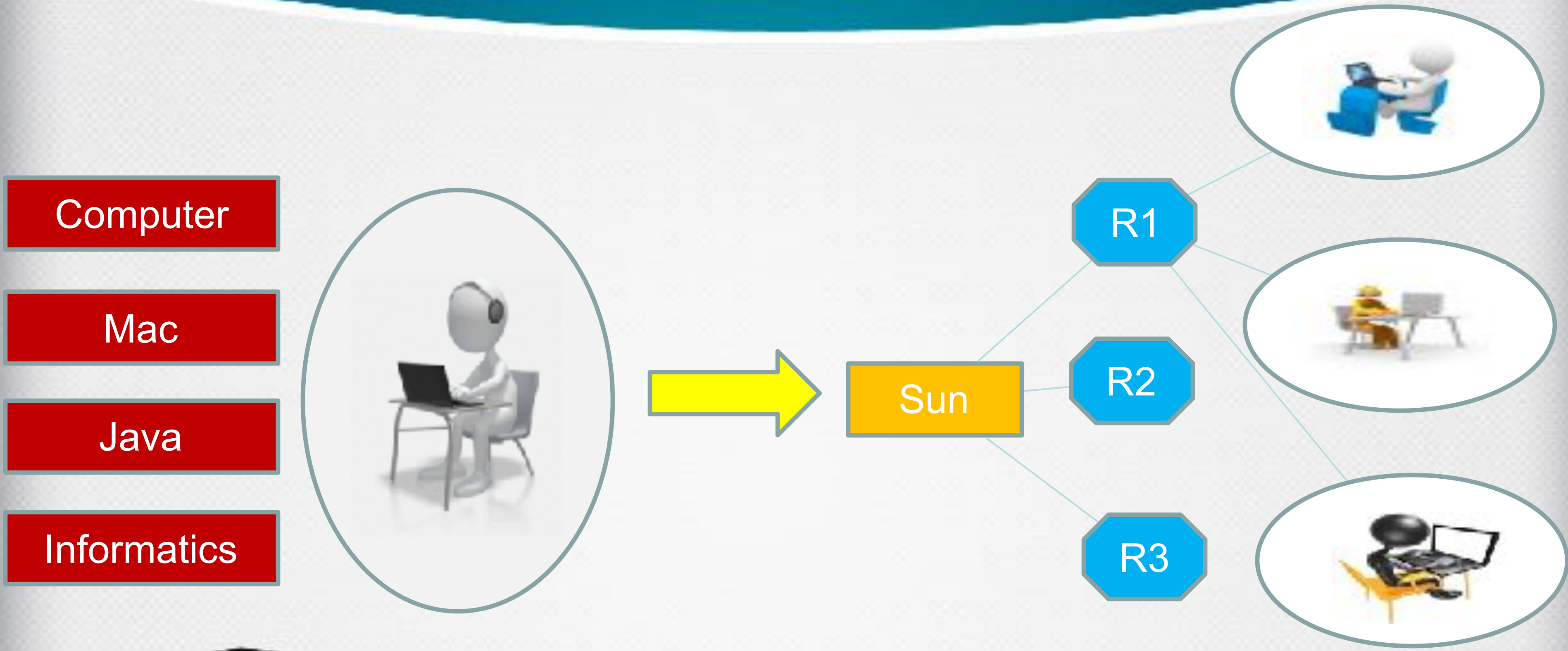
Steps

(1)

(2)

(3)

Example



Example

Sun

	T1	T2	T3	…	…	Tn
L1						
L2						
L10						
L11						
L12						
Lm						

	L1	L2	…	L10	L11	L12	Lm
R1							
R2							
R3							

	L1	L2	…	L10	L11	L12	Lm
R1							

R1

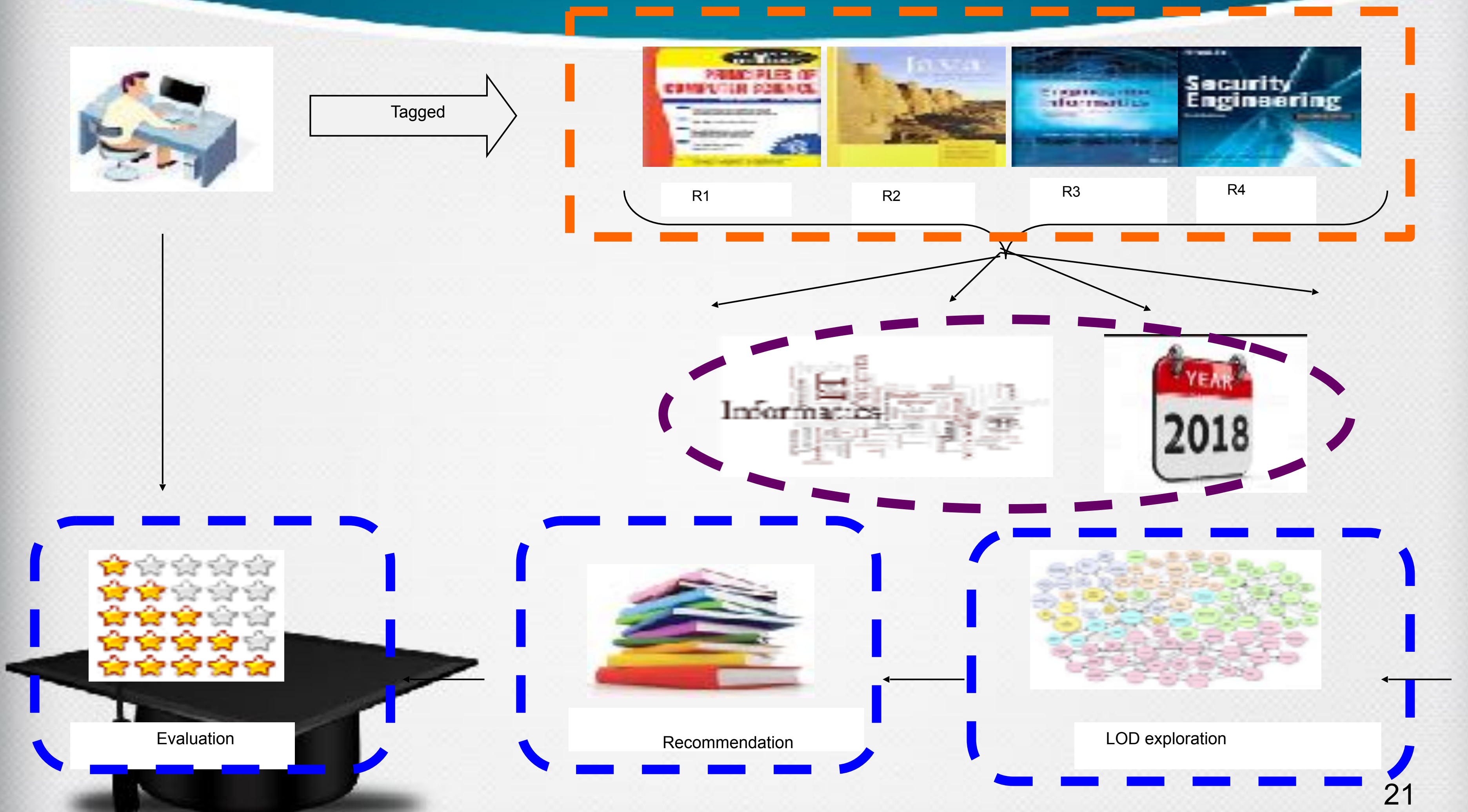
R2

R3

	T1	T2	T3	…	…	Tn
L1						
L2						
L10						
L12						

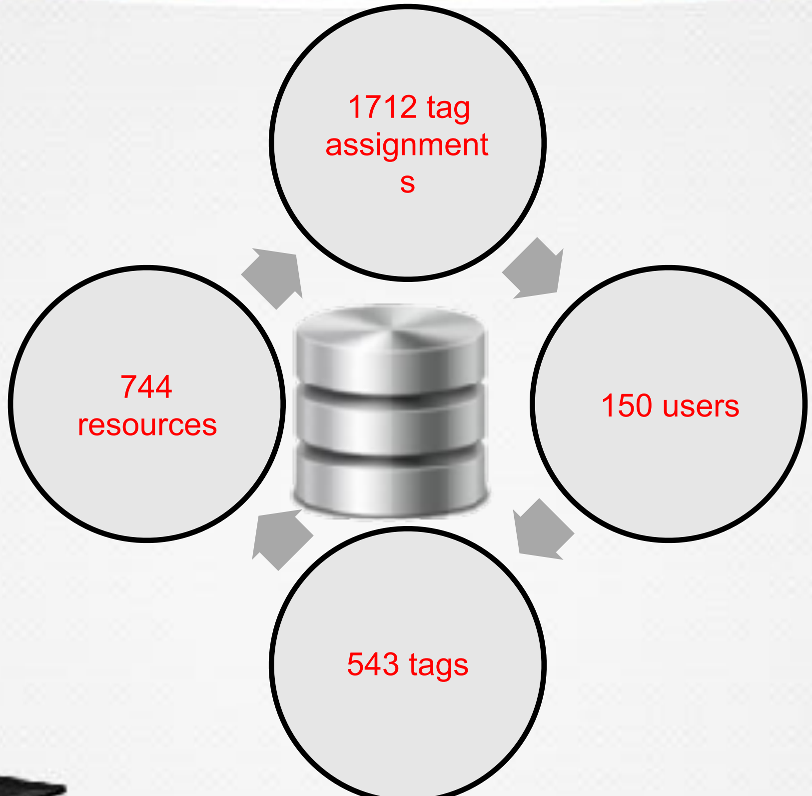
Diversity in Recommendation

LOD exploration to insure diversity and novelty



Del.icio.us database

120 association rules (support= 0.5 and confidence = 0.6.



computer ⇒ programming: 60% of the users using the tag "computer" also use the tag "programming".

Evaluation Methodology

Select a set of tags containing ambiguous tags: (114 tags)

We randomly removed sets of resources tagged by these ambiguous tags.

Repeat this process five times for each tag in order to make a cross-validation.

Experimental Results

Precision	Recall	F1	Diversity	Novelty
0.78	0.71	0.74	0.76	1.2

- Deviation value:

Precision	Recall	F1	Diversity	Novelty
0.15	0.09	0.1	0.2	0.34

The averages are very promising for the community in general ➔ the small values of standard deviations indicate that the metrics are also promising for each user individually.

Conclusion


&


BBC Programmes
Chord symbols
Audio Scrobbler
Magnatune
Audio on the web
US Census Data
RKB Explorer
Project Gutenberg

Future work

- Ant Colony Optimization (ACO) Algorithm
- Event detection

Thanks…

s.beldjoudi@epst-annaba.dz