Multimedia, InfoRmation systems and Advanced Computing Laboratory
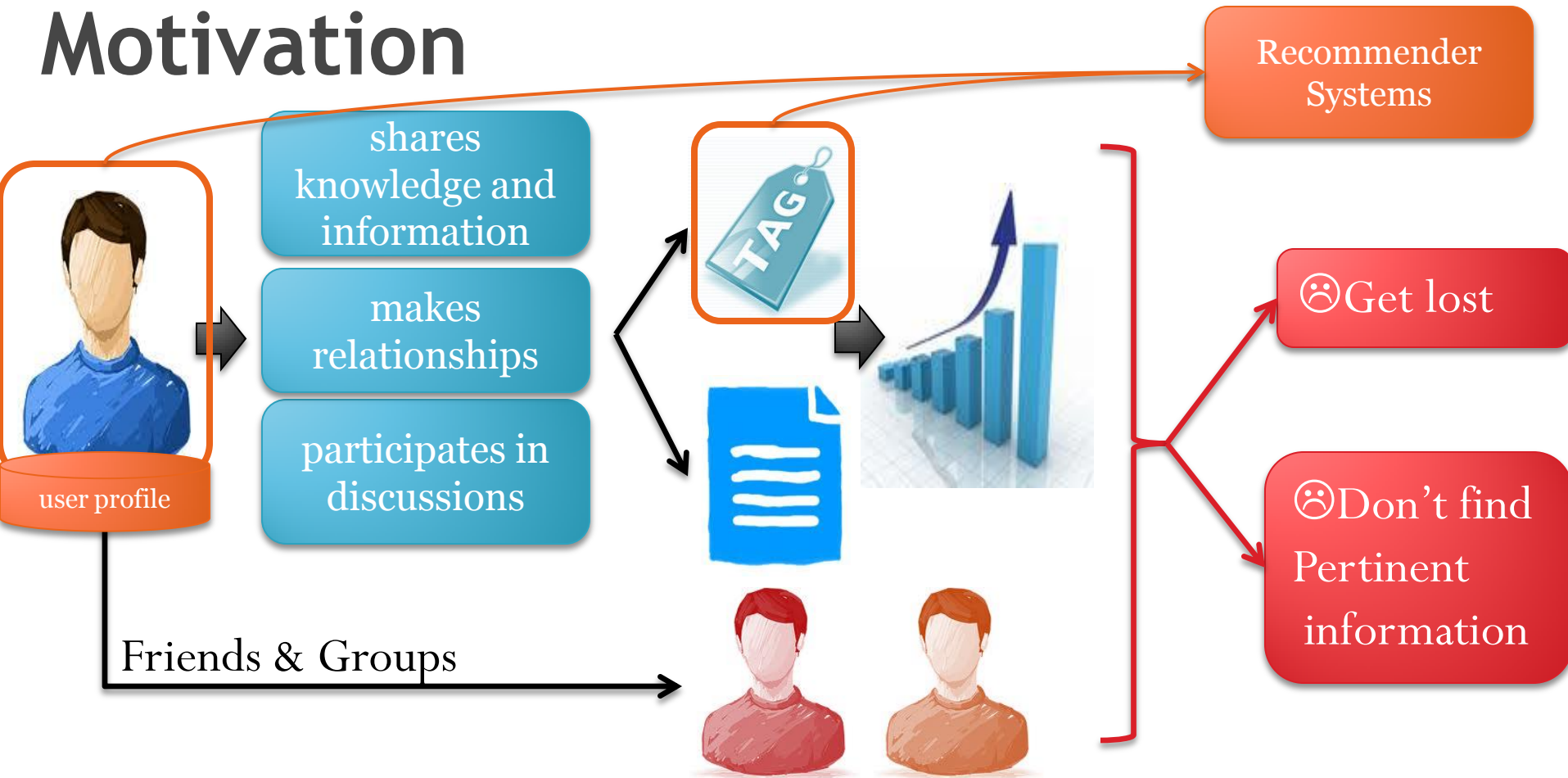Sfax, Tunisia

A User Profile Modelling Using Social Annotations: a Survey

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Lyon, France

Motivation

Recommender Systems

user profile

shares knowledge and information

makes relationships

participates in discussions

Friends & Groups

TAG
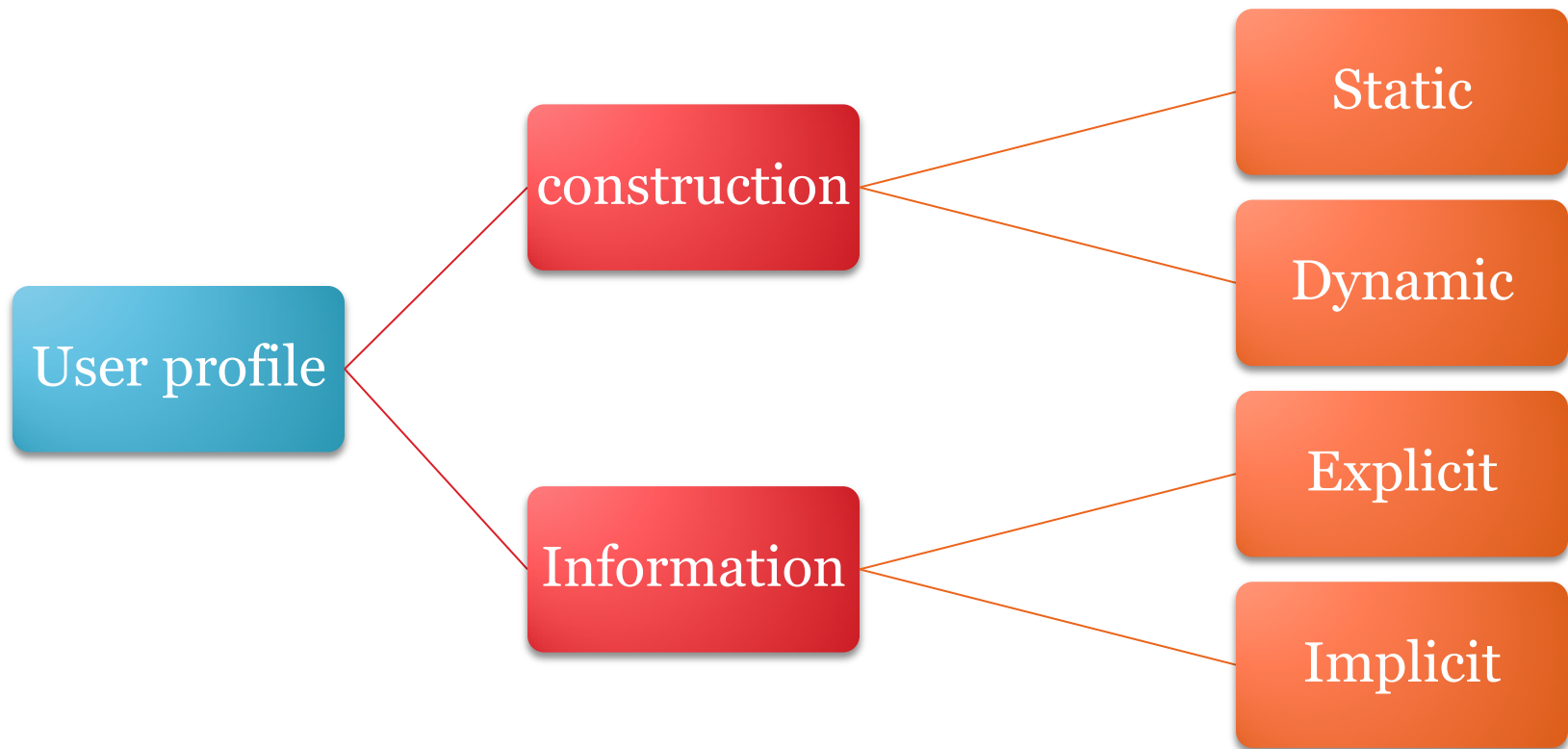
☹Get lost

☹Don't find Pertinent information

Social elements could avoid this disorientation like the social annotations (tags) which become more and more popular and contribute to guide the social user

Outline

- Social user profile modelling
  - Characteristics of social user
  - Representation of social user
  - Tag-based user profile update
- Tag's treatment
- Social Recommender systems
- Conclusion and perspectives

Characteristics of social user (1/3)

```
                                    ┌──────────┐
                          ┌────────▶│  Static  │
                  ┌──────────────┐  └──────────┘
            ┌────▶│ construction │
            │     └──────────────┘  ┌──────────┐
    ┌──────────────┐       └───────▶│ Dynamic  │
    │ User profile │                └──────────┘
    └──────────────┘
            │     ┌──────────────┐  ┌──────────┐
            └────▶│ Information  │─▶│ Explicit │
                  └──────────────┘  └──────────┘

                                    ┌──────────┐
                          └────────▶│ Implicit │
                                    └──────────┘
```

Characteristics of social user (2/3)

- The creation of social networks provides additional user's behaviors
- The user is no longer representing the audience, but has become an active contributor for creating the social information

Actif
- exchange information
- participate in groups and blogs
- etc

Curious
- compare for a better information
- search for advice
- etc.

Social annotations

Characteristics of social user (3/3)

Social annotations:

- ▫ User generated keywords

Outline

- Social user profile modelling
  - Characteristics of social user
  - Representation of social user
    - Vector
    - FOAF Ontology
    - Tag ontology
  - Tag-based user profile update
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Representation of social user (1/3)

- *Vector:*
  - Weighted vector for a recommendation purpose or in cross-system context:

$$u = <w(t_1), w(t_2), ..., w(t_k) >$$

  where w(t_k) denotes the weight of tag t_k with user u

Representation of social user (2/3)

- ***FOAF Ontology***
  - Represents the user in social networks
  - Describes relations between users through the element "Knows" through five dimensions:

FOAF Basics	Personal Information	Projects and Groups	Online Accounts	Documents and images

  - Is used in:
    - Recommender systems
    - Management of the user profile in cross-system context

Representation of social user (3/3)

- ***Tag ontology***

Characteristics \ Types	Tag ontology	Meaning of a tag	Social Semantic Cloud of Tags	Common Tag	Nice tag	The Modular Unified Tagging Ontology
Namespace	tags:	moat:	scot:	ctag:	nt:	muto:
Purpose	First formal tagging ontology	:tags extension for semantic tagging	:tags extension for tag clouds	Optimized for RDFa	Tagging as speech acts	Unification, modularization
Tag	tag	tag	tag	tag	tagAction	hasTag
Resource	taggedRessource		tagspace	tagged	taggedResource	hasResource
User	foaf:Agent	foaf:Agent	sioc:user	foaf:maker	sioc:creator	hasUser
Authors	Newmann *et al.*	Passant *et al.*	Kim *el al.*	Tori *el al.*	Limpens *et al.*	Lohmann *et al.*
1st publication	23-03-2005	15-01-2008	23-03-2007	08-06-2009	09-01-2009	02-09-2011
Related vocabulary	FOAF, SKOS, DC	FOAF, SIOC	SIOC, FOAF		FOAF, SIOC	FOAF, SIOC, SKOS, DCTERMS, MOAT…

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- Social user profile modelling
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    - In recommendation context
    - In cross system context
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Tag-based user profile update (1/3)

- The social user is very active and may be interested in many different subjects for a short time
- The update is considered as an enrichment of the user profile, in which additional information deduced from the user's behaviour is integrated in his profile

Additional information

Enrichment
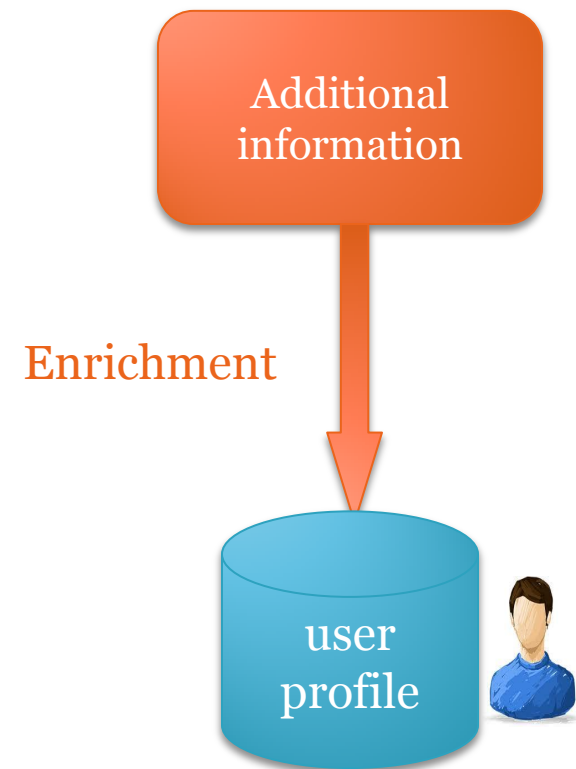
user profile

Tag-based user profile update (2/3)

- In recommendation context

	Technique	Advantages	Disadvantages
De Meo *et al.*, 2010	- Enrich user profiles by "authoritative" tags, which are tags considered as important	☺ Useful compared to other methods ☺ Tags are automatically filtered and ranked at the same time ☺ The filtering technique is simple to use and fast	☹ It does not consider semantics of tags and the context of user in the recommendation process ☹ There is a risk of having no precise information through the filtering technique
Kim *et al.*, 2011	- Enrich a user model with collaboration from other similar users - The collaborative user modelling is made through detecting a user's neighbour and then enriching the user profile through the neighbour's topics	☺ The method is promising	☹ No consideration of the semantic aspect of tags
Beldjoudi *et al.*, 2011	- Enrich user profiles with relevant resources based on association rules extracted from the social relations - In order to improve the quality of the recommendation, tag ambiguity is detected by finding similar users and resources	☺ This approach deals with a tag's ambiguity	☹ It does not consider the semantic ambiguity of these tags

Tag-based user profile update (3/3)

- In cross system context

	Technique	Advantages	Disadvantages
Abel *et al.*, 2011	-Use semantic user modelling based on Twitter posts to create semantically rich user profiles. - This method is graph based.	☺ The method deals with the user's interests through people of interest, topics, event, etc.	☹ Do not consider the evolution of a user profile through time
Abel *et al.*,2011	- Enrich tag-based profiles based on association rules deduced from observation across two systems	☺ This approach is a good issue to model a user through his different social profiles, and to enrich this profile with semantic enrichment to decrease a tag's ambiguity	☹ Do not consider the evolution of a user profile through time

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TAG'S TREATMENT (1/3)

- Tags are elements reflecting user's opinion:
  - Used by users for many purposes like: contributing and sharing, making an opinion, marking a place for a future search, making attention, etc. *(Gupta et al., 2010)*
- Tag's problems:
  - Don't follow any rules
  - Spam
  - Semantic ambiguity : many words have the same meaning
  - The folksonomy
    - is very diverse : blog, blogs, blogging
    - have a lack of classification and do not handle synonyms and homonyms

TAG'S TREATMENT (2/3)

- Detecting Spam:
  - Georgia Koutrika *et al. 2007*, define tag spam as:
    - *"misleading tags that are generated in order to increase the visibility of some resources or simply to confuse users"*
    - Evaluate the impact of tag spam with a unit called *SpamFactor*
  - Wetzker et al., 2008 try to detect spam by:
    - Propose a concept named "*diffusion of attention*", which can reduce the influence of spam in tag distribution and without a filtering process
    - Technique which gives a maximum number of tags for each resource and so limits the influence of the user
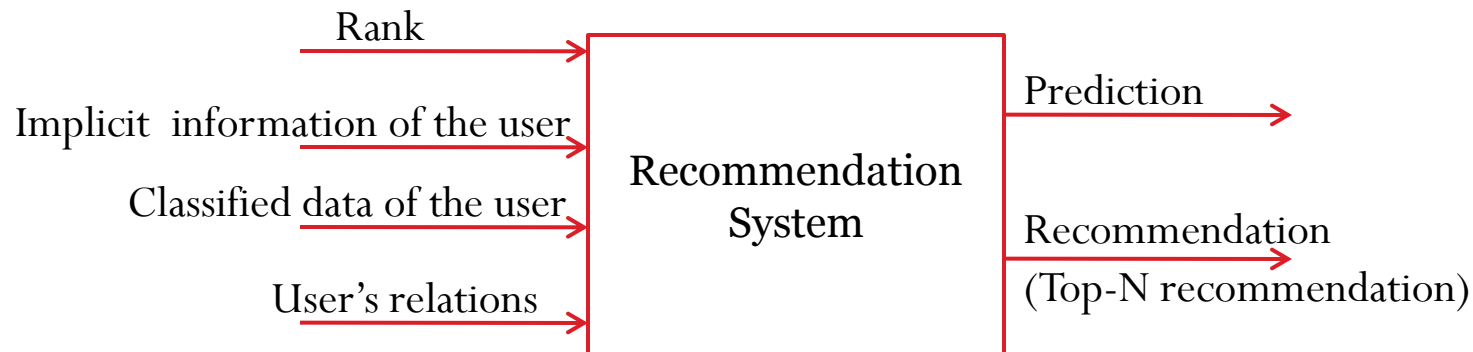
TAG'S TREATMENT (3/3)

- Tag's ambiguity :
  - By using a tool which can detect : a natural language, synonyms/homonyms, etc. (like WordNet dictionary)
  - By classifying tags according to a specific ontology (like Carmagnola et al., 2008):
    - Proposed /free tags
    - Generic/specific tags
    - Synonym tags
    - Contextual tags
    - Subjective tags
    - Organizational tags

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Social Recommender Systems

✓A recommendation is an adaptation technique:
  ✓Provide to the user information he needs
  ✓Avoid disorientation of the user

Rank ──────→ ┌─────────────────┐ ──────→ Prediction
             │   │
Implicit information of the user ──────→ │   │
             │ Recommendation │
Classified data of the user ──────→ │   System   │ ──────→ Recommendation
             │   │   (Top-N recommendation)
User's relations ──────→ └─────────────────┘

Reference: Eda Ercan 2010

SOCIAL RECOMMENDER SYSTEMS

	Tag			User					
	Weight og tag	Semantic aspect of tag	Filtering tag	Representation			Characteristics		User interest update
				Vector	Graph	Other	Static	Dynamic	
De Meo et al., 2010	✓		✓		✓				
Kim et al., 2011	✓					✓			
Nauerz et al., 2008						✓			
Xu et al., 2011									
Pan et al., 2011			✓			✓		✓	
Carmagnola el al., 2008		✓				✓		✓	✓
Carmagnola et al., 2011		✓				✓		✓	✓
Huang et al., 2010			✓			✓			

reflect how the tag is importa

help detec tag ambigu

eliminates inappropriate tags

knowing the user's interest as they change over time

includes the tagging behaviour

CONCLUSION AND PERSPECTIVES

- Social user:
  - Characteristics
  - Representation of tag-based profile
    - Techniques and ontology
  - Techniques for update in :
    - Recommendation context
    - Cross-system context
- Social annotations:
  - Limits & Solutions
- The study of a tag-based profile in a social recommendation systems

CONCLUSION AND PERSPECTIVES

- Construct a tag-based profile which takes into consideration:
    - The weight of tags
    - The semantic aspect of tags
    - The filtering of tags
    - The static and dynamic aspect of user profile representation

- Gather information from the FOAF user's profile and the tags assigned by the user:
    - Semantic analysis and distance

- Update of the user's interest should take into considerations:
    - The social behavior of the user including his tagging behavior
    - Social elements like "similar" users

- Resolve the tag's ambiguity problem through a semantic way, by:
    - Extracting meaningful tags
    - Filtering the insignificant ones

Thanks for your attention

...Questions ?

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