Extraction d'instances de relations n-aires issues d'articles scientifiques guidée par une ontologie

Séminaire Sémantic Linked Data 2021

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Introduction

Extraction de relations n-Aires dans des publications scientifiques en domaine de spécialité

determined using a calibration curve prepared with gallic acid, and the results reported as mg/l.

3. Results and discussion

3.1. The effect of antioxidants on the OP of edible films containing SA

Fatty acids, such as SA, LA and PA, being edible and having hydrophobic character, are used in coating formulations as water vapour barrier materials. In previous work we had found SA to be more effective than LA and PA for decreasing WVP of cellulose-based edible films (Ayranci & Tunc, 1997, 2001). Therefore, it was of interest to see how the OP of these films was affected by the SA content. The OP values of MC-based edible films, containing varying amounts of SA in their composition, were determined by the method developed in the present work, as described earlier, and are given in Table 2, together with film thickness values.

The general trend is that the OP increases with increasing SA content of the film. This may be attributed to the formation of holes in the crystal structure of edible films as the SA content increases. These holes, which are especially formed above 15 g SA/100 g MC,

Table 2
The SA content, the thickness and the OP values of edible films at 25 °C and 0% RH

SA content g (100 g MC)$^{-1}$	Thickness 10^5 m	OP 10^9 g d^{-1} Pa^{-1} m^{-1}
0.0	1.86±0.00	6.8±0.4
5.0	1.93±0.03	5.2±0.2
15	2.10±0.01	7.7±0.9
25	1.88±0.04	8.6±0.3
40	2.00±0.00	14±1

It is clear from Table 3 that OP values of films decrease with both AA and CA contents. The only exception to this trend is at 16.7 g CA/100 g MC content. The OP values of this film were found to be slightly larger than that of the film with 3.33 g CA/100 g MC. The two antioxidants show similar effects in improving the oxygen barrier property of the films.

3.2. The effects of coating on water loss of fresh foods

The water loss of mushrooms, with coatings of varying composition, given in Table 1, and of uncoated ones, as a function of time, are shown in Fig. 2. In the coating formulations, an intermediate SA content of 20 g/100 g MC (which is equivalent to 0.6 g/3 g MC) and the highest examined CA or AA content of 16.7 g/100 g MC (which is equivalent to 0.5 g/3 g MC) were maintained according to the results presented above in Section 3.1. The % water losses of uncoated mushrooms are 3.86, 14.7 and 19.7 at the end of first, third and fifth days, respectively. Mushrooms with coatings of varying

Table 3
The antioxidant content, the thickness and the OP values of edible films containing 20 g SA/100 g MC at 25 °C and 0% RH

Antioxidant content g (100 g MC)$^{-1}$	Thickness 10^5 m	OP 10^9 g d^{-1} Pa^{-1} m^{-1}
AA		
0.33	1.9±0.2	8.3±0.2
1.67	1.87±0.03	6.5±0.1
3.33	1.8±0.0	5.8±0.2
16.67	1.80±0.02	4.5±0.2
CA		
0.33	1.68±0.0	6.4±0.3
1.67	1.57±0.03	5.39±0.03
3.33	1.49±0.01	3.9±0.2
16.67	1.62±0.02	4.7±0.2

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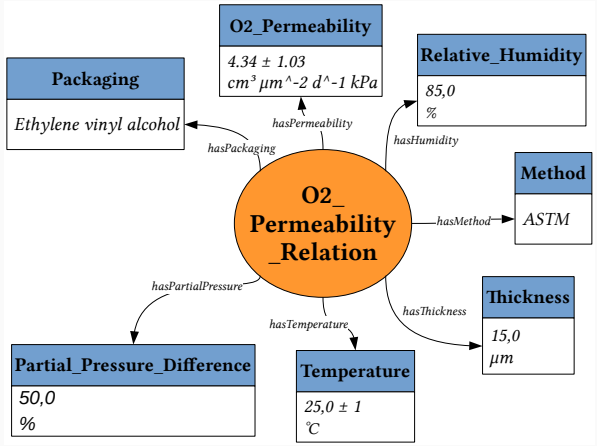
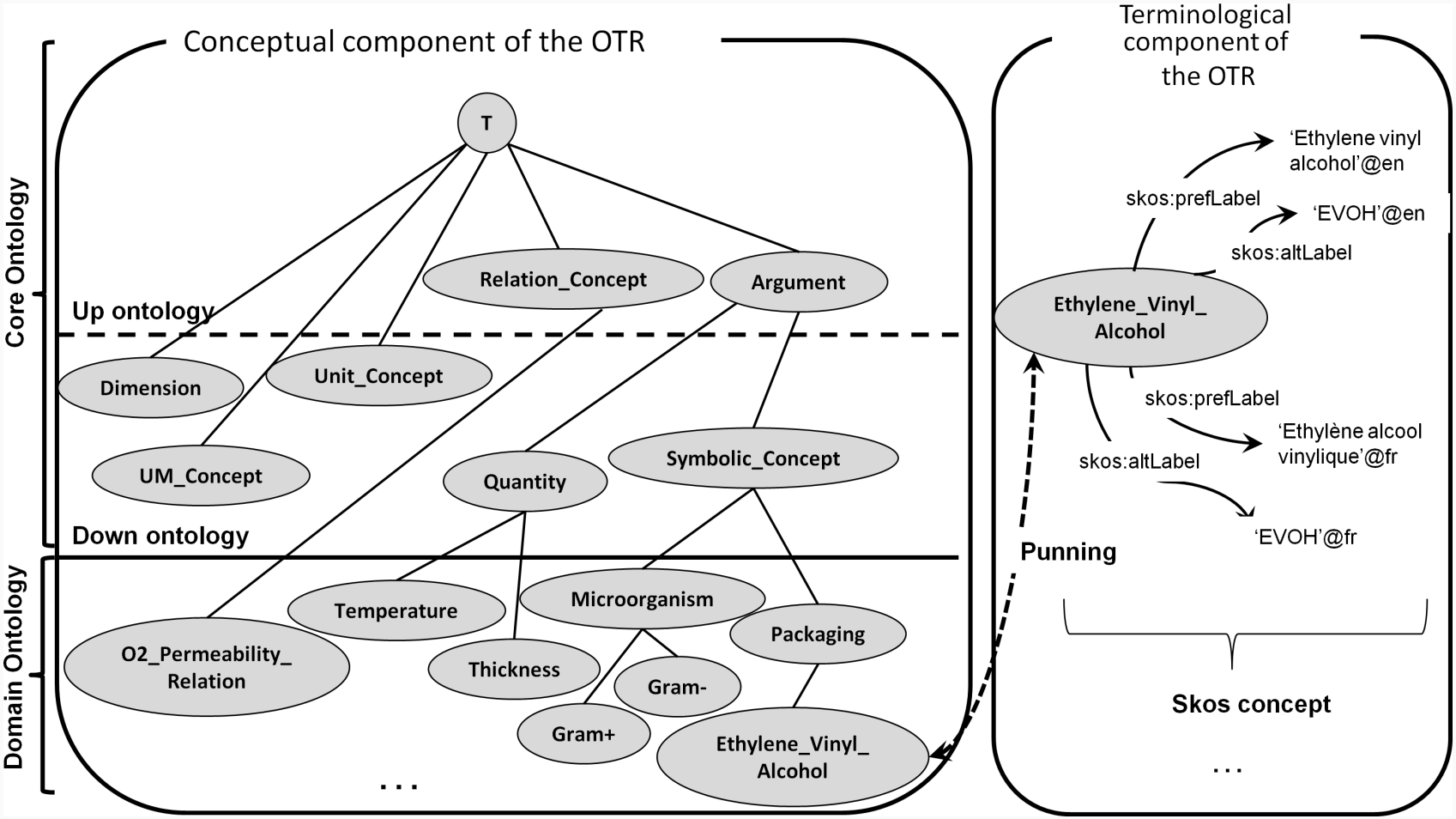
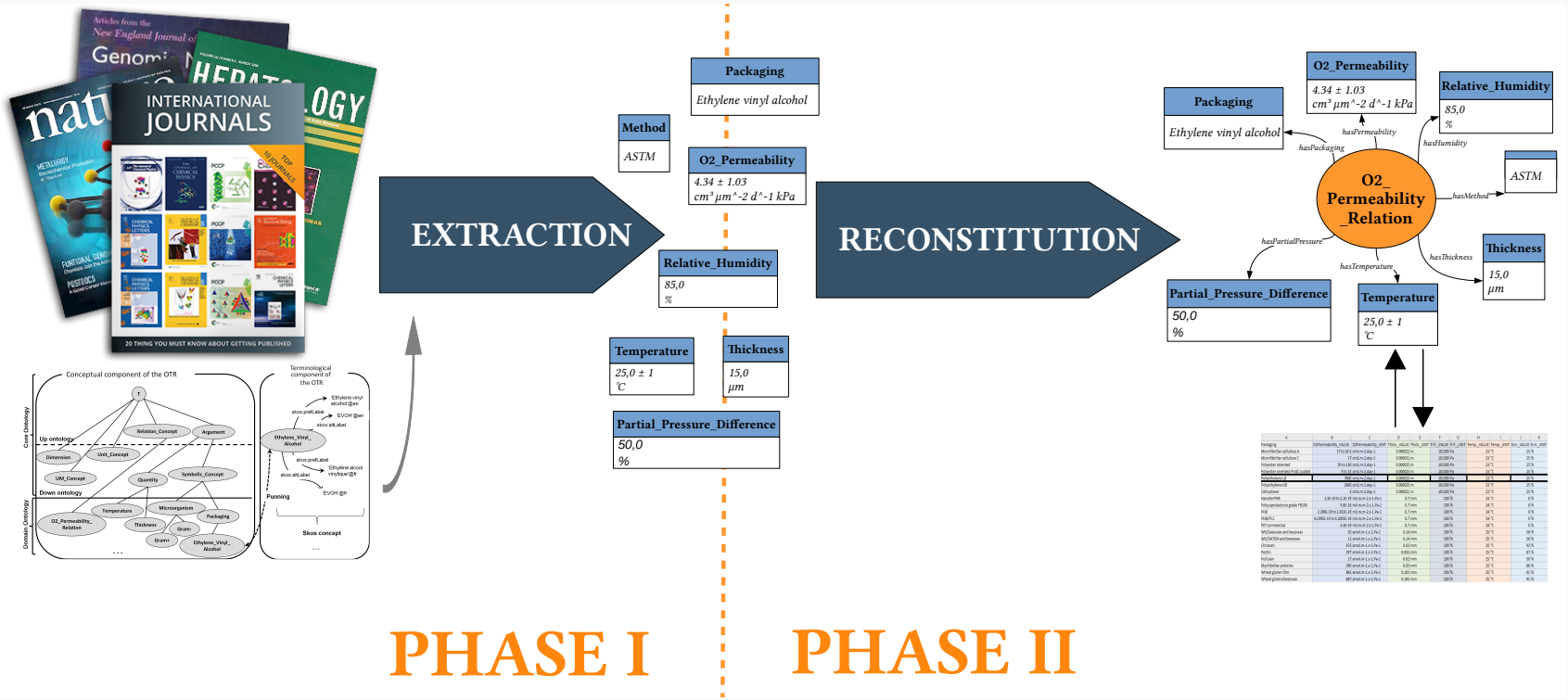


Ressource Termino Ontologique (RTO)



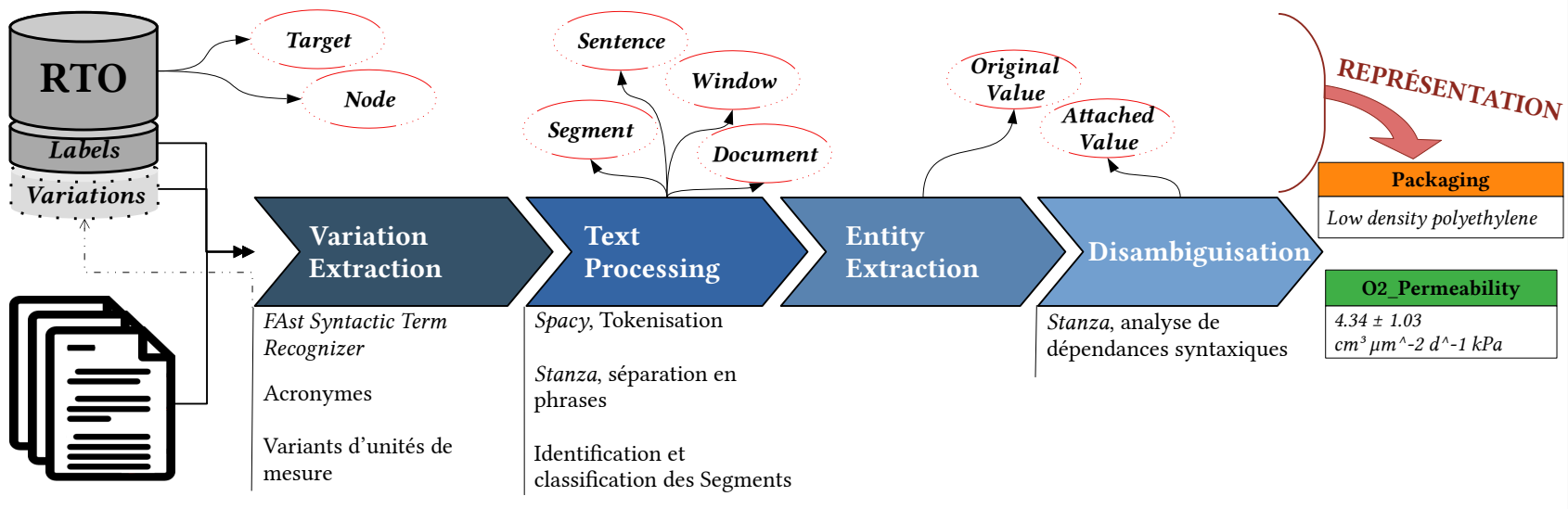
RTO de domaine TRANSMAT `https://ico.iate.inra.fr/atWeb/`

Cadre général



- **Phase I** : extraction des instances d'arguments guidée par une ontologie de domaine
- **Phase II** : reconstitution des instances de relations n-Aires

PHASE I



Scientific Publication Représentation (SciPuRe)

	Descripteur	Valeur
LEXICAL ONT.	Target	`Perm.`
	Node	`O2_Perm.`
	OriginalValue	$4.34 * 10^{-3}$
		$cm^3 \mu m m^{-2}$
		$d^{-1} kPa$
	AttachedValue	*permeability*

	Descripteur	Valeur
STRUCTURAL	Sentence	*The low ... kPa*
	Window	*Film ...,*
		The ... kPa,
		$\emptyset$
	Segment	*Results*
	Document	*Faro and al.*

Résultats de l'extraction des instances d'arguments

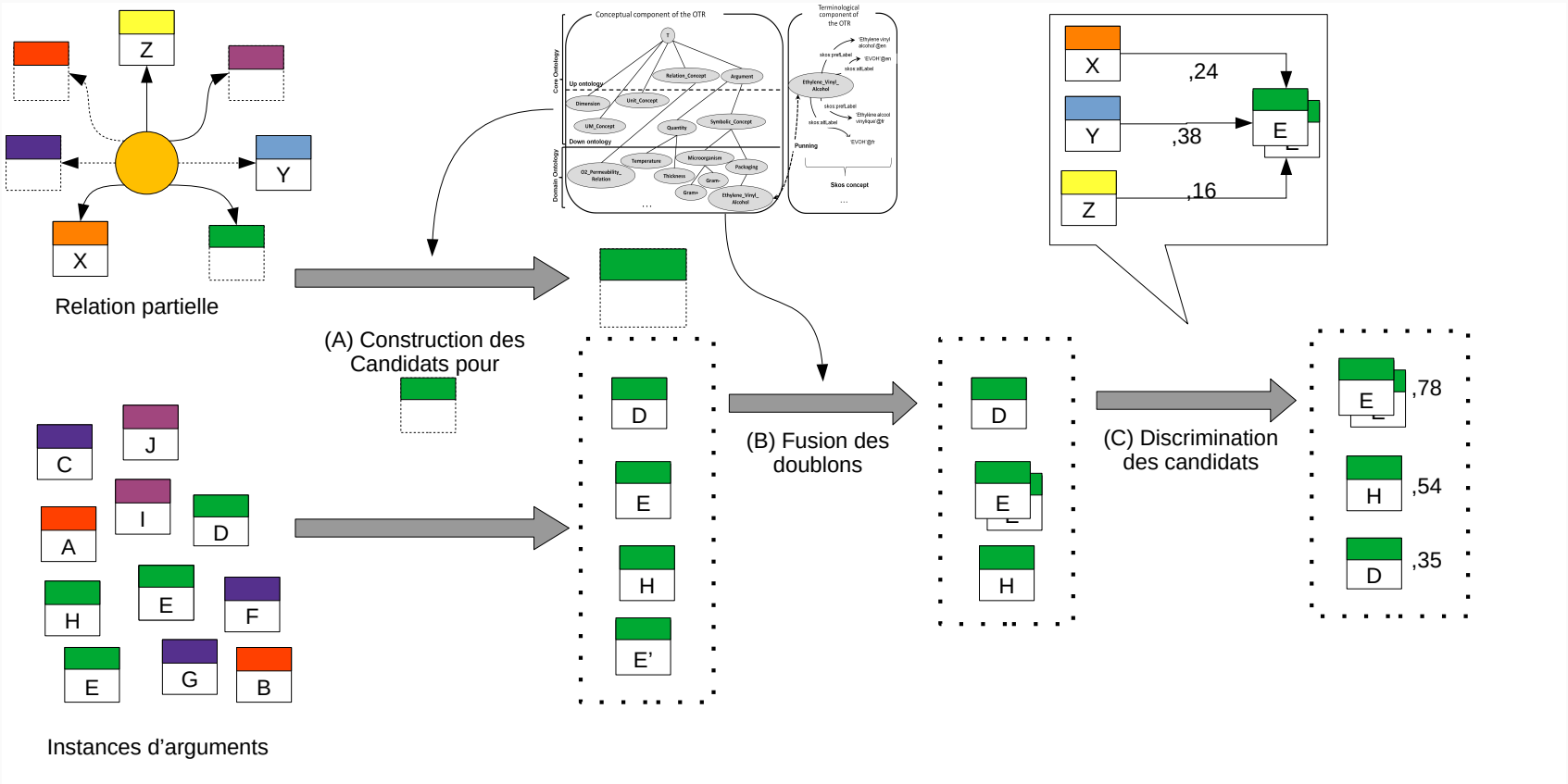
Target	recall (%)	precision (%)	F-score (%)
SYMBOLIC	85	47	61
packaging	86	37	51
component	84	56	67
method	77	16	26
QUANTITATIVE	86	14	24
permeability	83	16	27
relative_humidity	88	28	43
thickness	100	14	24
temperature	83	08	15
GENERAL	**85**	**41**	**55**

Lentschat, M., Buche, P., Dibie-Barthelemy, J., Roche, M., (2021) 'Representation and Relevance Scores of experimental data extracted with an ontological and Terminological Resource', *International Journal of Intelligent Information and Database Systems*. **a paraître**

DATAVERSE : *"TRANSMAT Gold Standard"*, doi:10.18167/DVN1/U7HK8J

PHASE II

- Débuter par l'extraction des relations n-Aires partielles dans les tableaux.
- Complétion de ces relations avec les instances d'arguments présentes dans le texte.



Scientific Table Representation (STaRe)

	Descripteur	Valeur
ONTOLOGIQUE	Relation	`H2O_Permeability_Relation`
	Result_Argument	`H2O_Permeability`
	Arguments	{*Node* ; *Original_Value* ; *Attached_Value*}
		`Packaging`
		{*Node* ; *Original_Value* ; *Attached_Value*}
		`Method` ∅
		`Relative_Humidity`
		{*Node* ; *Original_Value* ; *Attached_Value*}
		`Temperature` ∅
		`Thickness` ∅
		`Partial_Pressure` ∅
STRUCT.	Table	*Table 3*
	Caption	*Water permeability of tested packaging at* 25°*C*
	Segment	*Results and Discussion*
	Document	*Development of films based on quinoa starch*

Intuitions

Trois approches pour rechercher les instances candidates à la complétion des instances de relations partielles en exploitant les descripteurs de *SciPuRe* et de *STaRe*.

Approche Structurelle

- recherche à proximité des tableaux.
- dans des sections spécifiques des documents selon l'argument.

Approche Fréquentiste

- mesure des cooccurrences fréquentes dans les textes

Approche par Plongements Lexicaux

- calcul de similarité selon un modèle de langage *word-embedding*

DATAVERSE : "*TRANSMAT n-Ary relations*", `doi.org/10.18167/DVN1/1BBJBQ`

Résultats

Un rappel haut, une précision selon le nombre de candidats sélectionnés

Approche	Critère	F-SCORE candidats sélectionnés 1	3	5	10
Structurelle	simple	.35	.58	.58	.65
Structurelle	guidée	.45	.56	.61	.74
Fréquentiste*	Jaccard	$.48^{d}_{a}$	$.54^{d}_{a}$	$.61^{p}_{o}$	$.66^{p}_{o}$
Fréquentiste*	Dice	$.46^{d}_{a}$	$.55^{d}_{o}$	$.60^{p}_{o}$	$.66^{p}_{o}$
Fréquentiste*	PMI	$.44^{d}_{o}$	$.53^{d}_{a}$	$.60^{p}_{o}$	$.68^{p}_{o}$
Plongements Lexicaux	core_web_trf	.40	.59	.64	.70
Plongements Lexicaux	core_sci_scibert	.39	.57	.65	.70

Les meilleurs scores sont obtenus en filtrant 20% des candidats selon leurs scores de pertinence

Conclusions

(I) Identification des instances d'arguments

- Une nouvelle représentation multi-descripteurs pour *discriminer les différences, identifier les similarités, décrire précisément et minimiser l'ambiguïté*.
- Des scores bâtis sur des critères sémantiques et lexicaux permettent de mesurer la pertinence.

(II) Reconstitution des relations n-Aires

- Une représentation des instances de relations n-Aires factorisant les descripteurs.
- Sélectionner plusieurs instances candidates permet de déployer une approche d'accompagnement des experts.
- La méthode de reconstitution des relations n-Aires partielles à choisir varie selon le nombre de candidats sélectionnés.

Merci de votre attention.

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(recherche post-doc 2022)