

Synthèse d'information

Quelques pistes de solutions explorées au sein de l'équipe IRIS

Karen Pinel-Sauvagnat

Problématique(s) traitée(s)

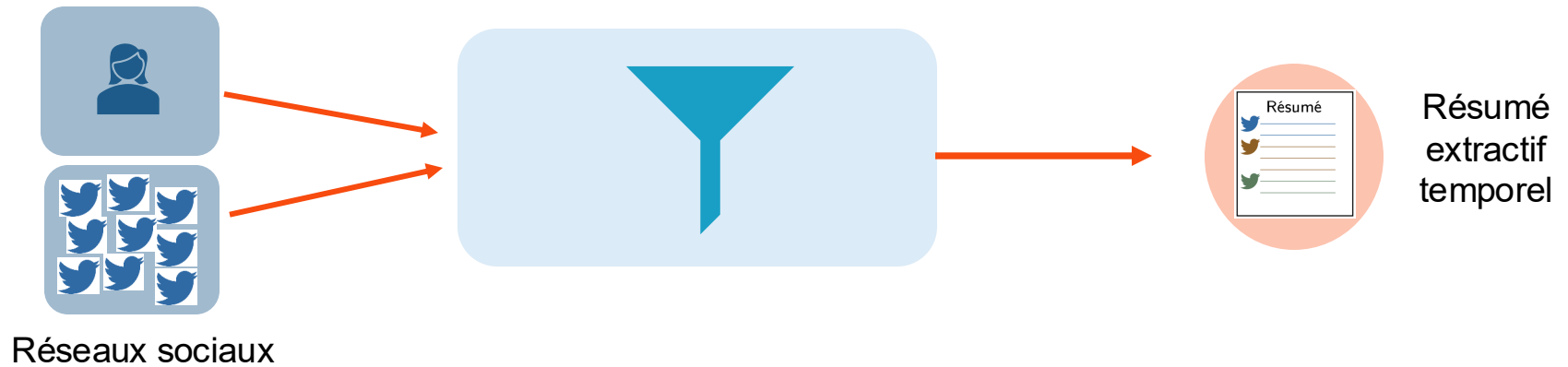


Problématique(s) traitée(s)



Veille
informationnelle

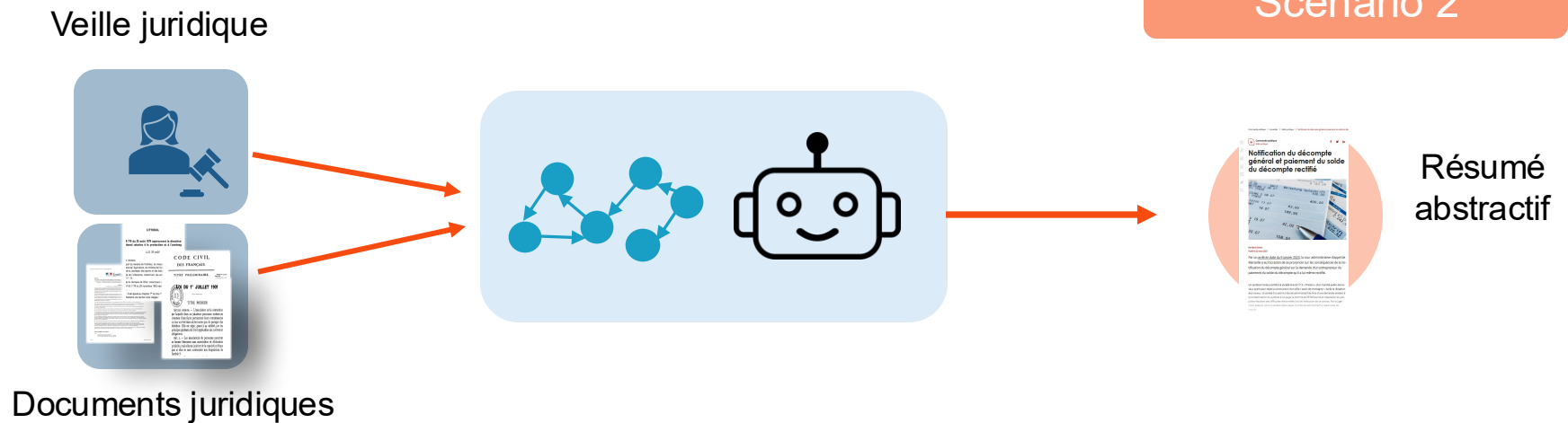
Scenario 1



Problématique(s) traitée(s)



Scenario 2



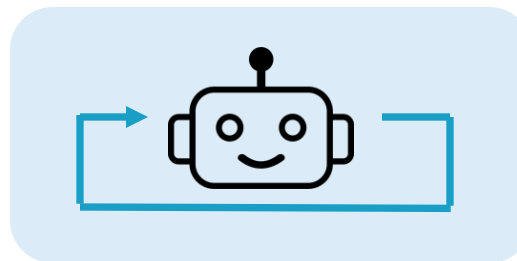
Problématique(s) traitée(s)



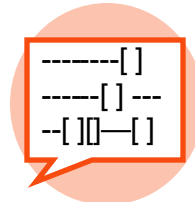
Requête utilisateur



Corpus



Scenario 3



Réponse générée et sourcée

S'informer sur les réseaux sociaux

[Travaux de thèse d'Alexis Dusart, 2022
Co-encadrement : Gilles Hubert]

Veille
informationnelle



Réseaux sociaux

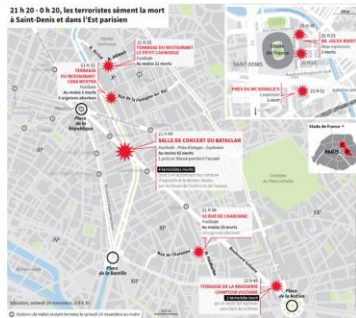


Scénario 1

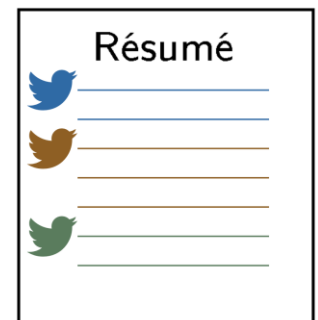
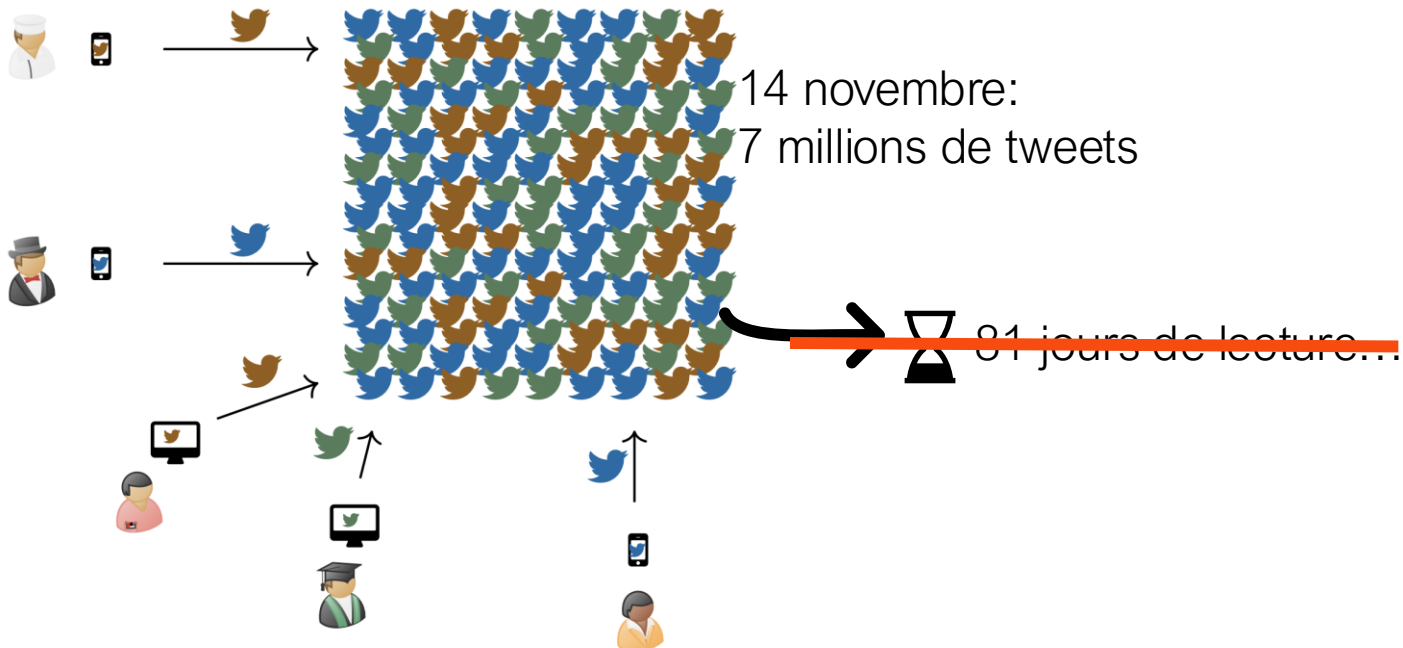


Résumé
extractif
temporel

Problématique

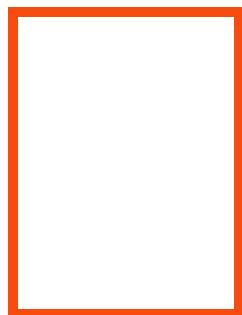
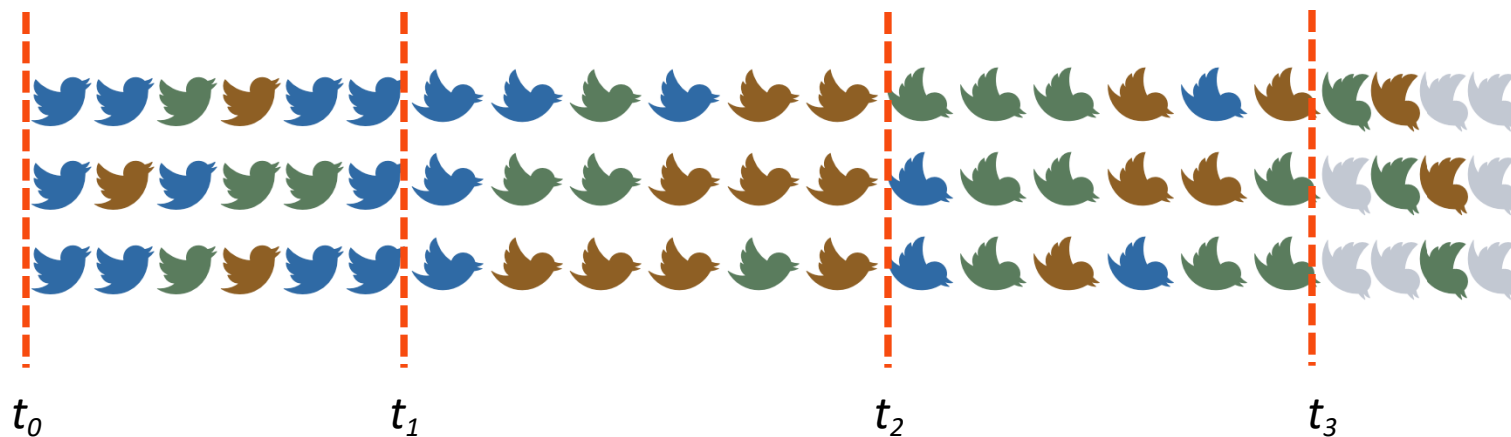


Attaques terroristes de Paris,
2015

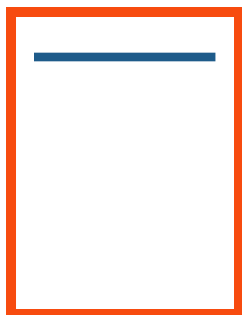


Objectif : résumé temporel extractif et incrémental

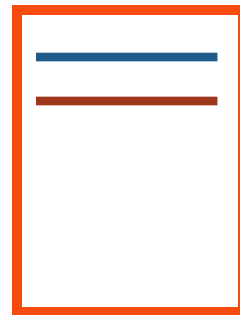
Evènement E : Attaques terroristes de Paris en 2025



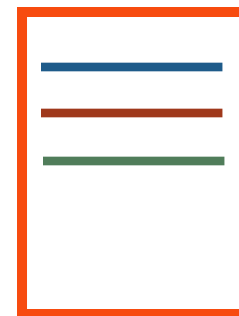
Résumé t_0



Résumé t_1



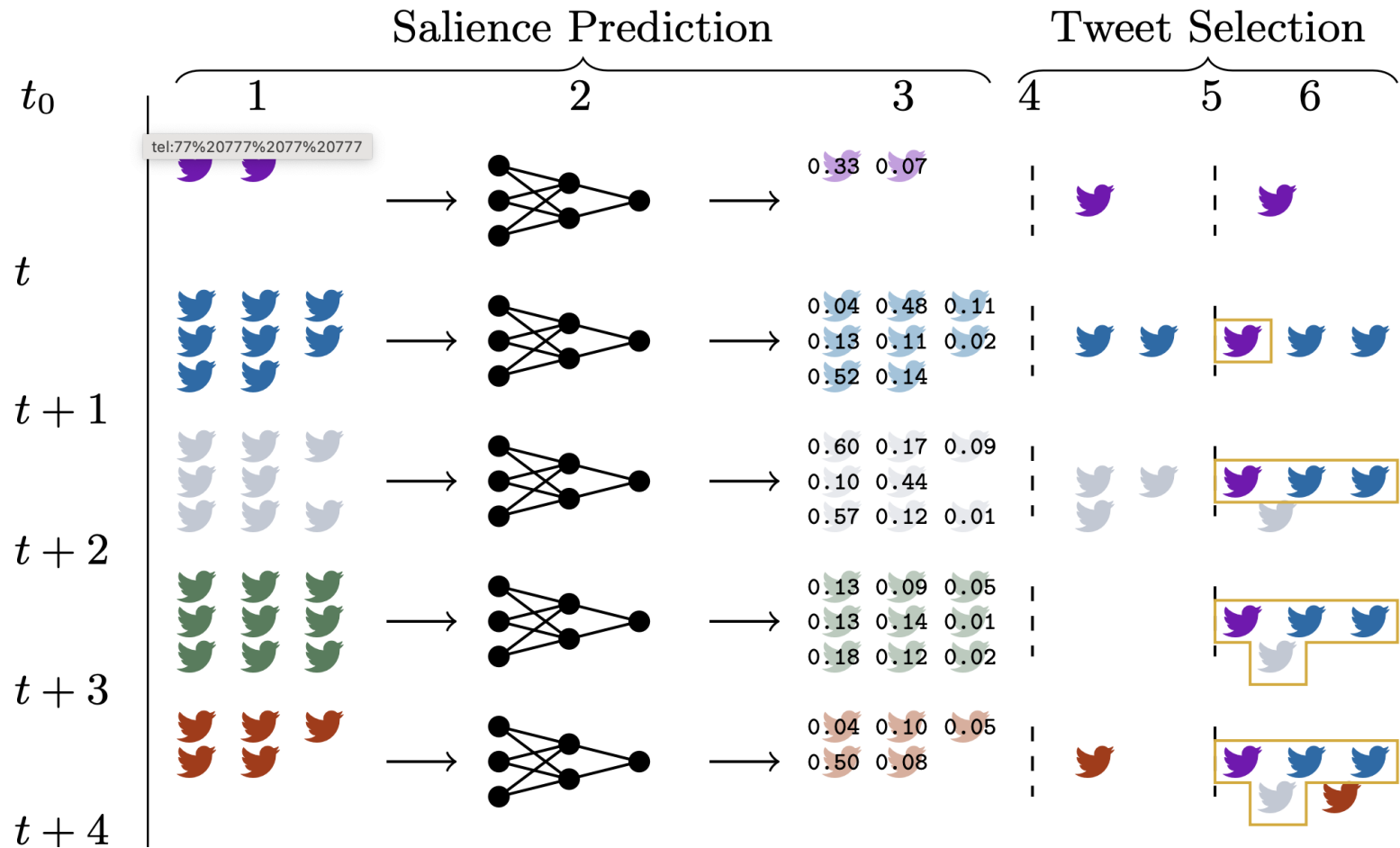
Résumé t_2



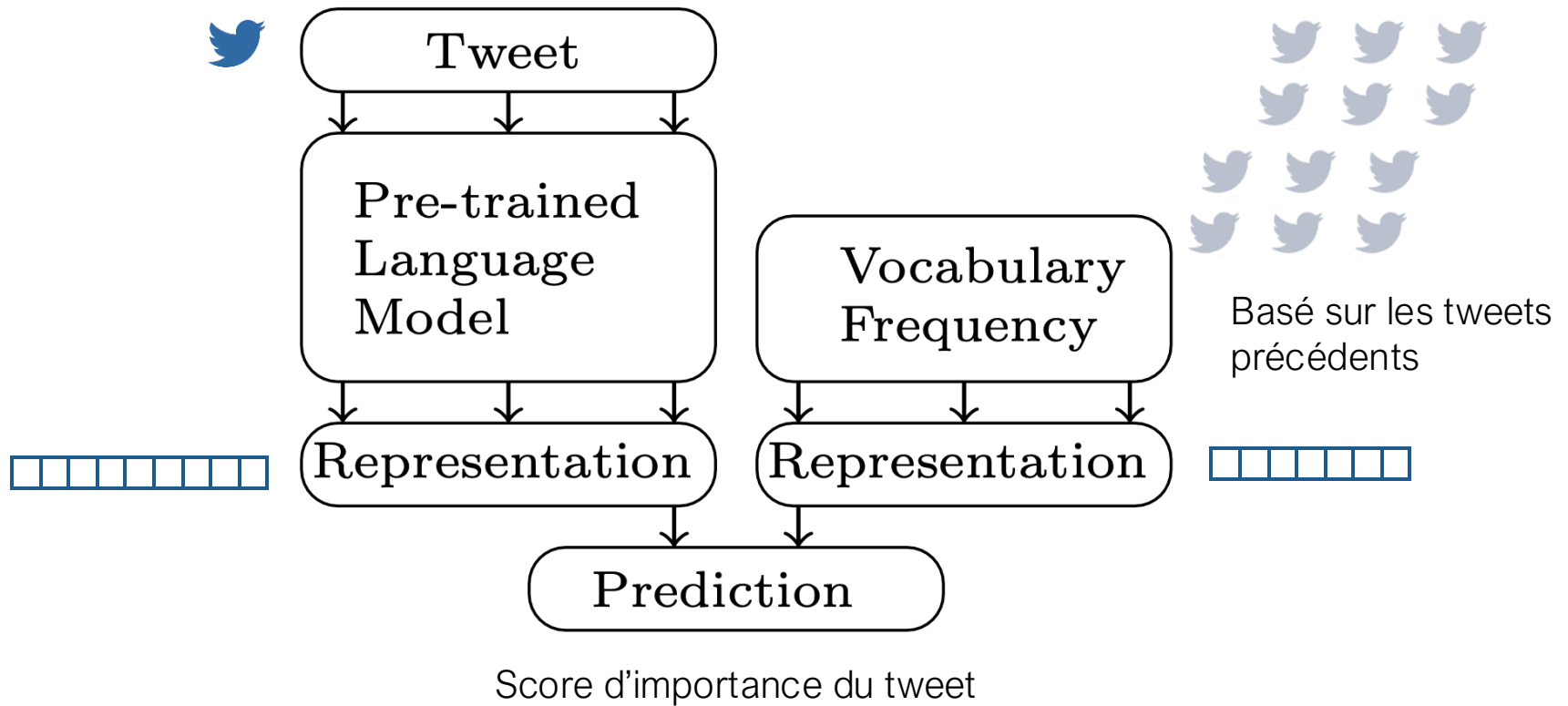
Résumé t_3

Comment ? Modèle proposé

Stream Start: t_0

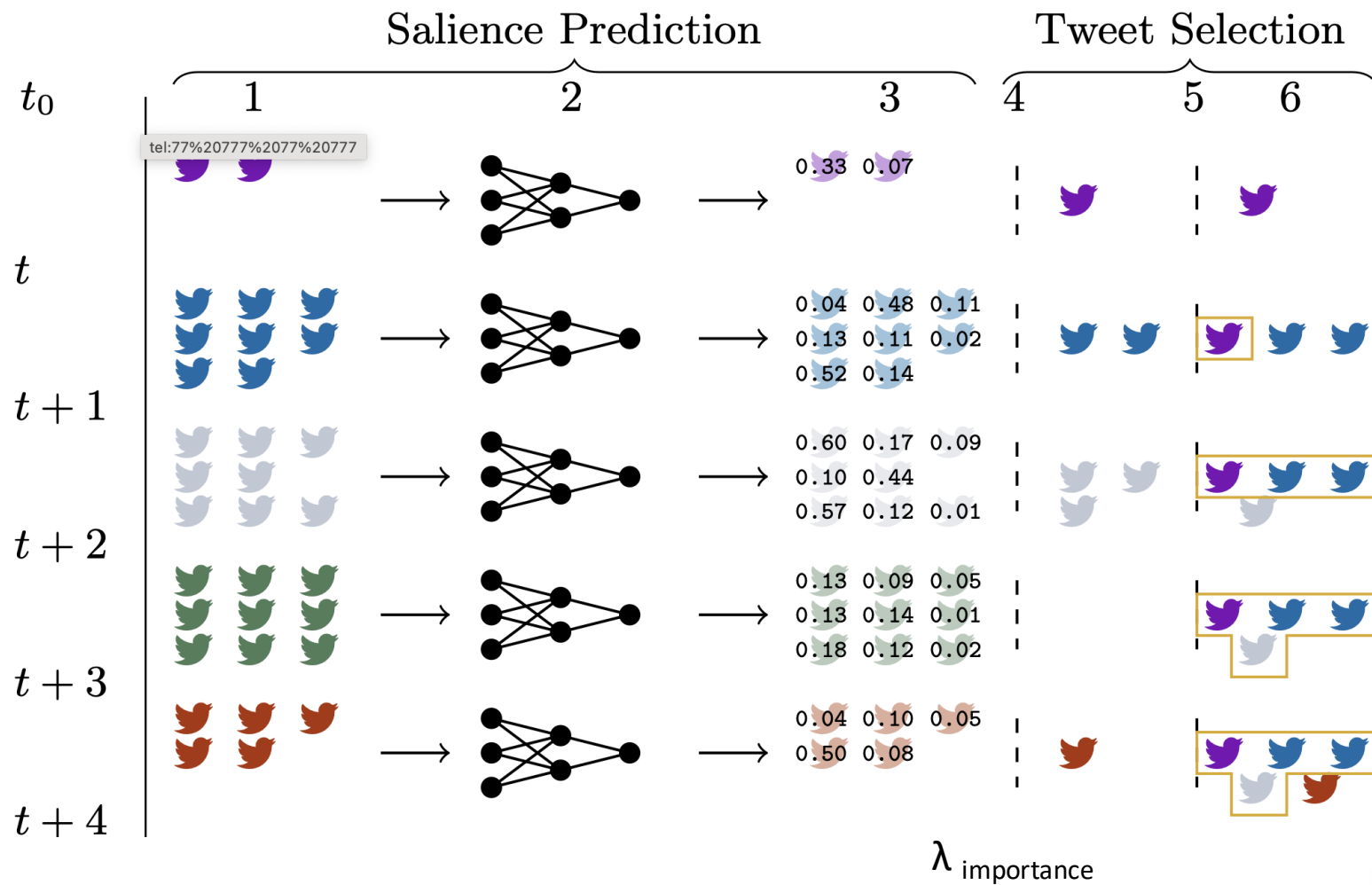


Prédiction de l'importance

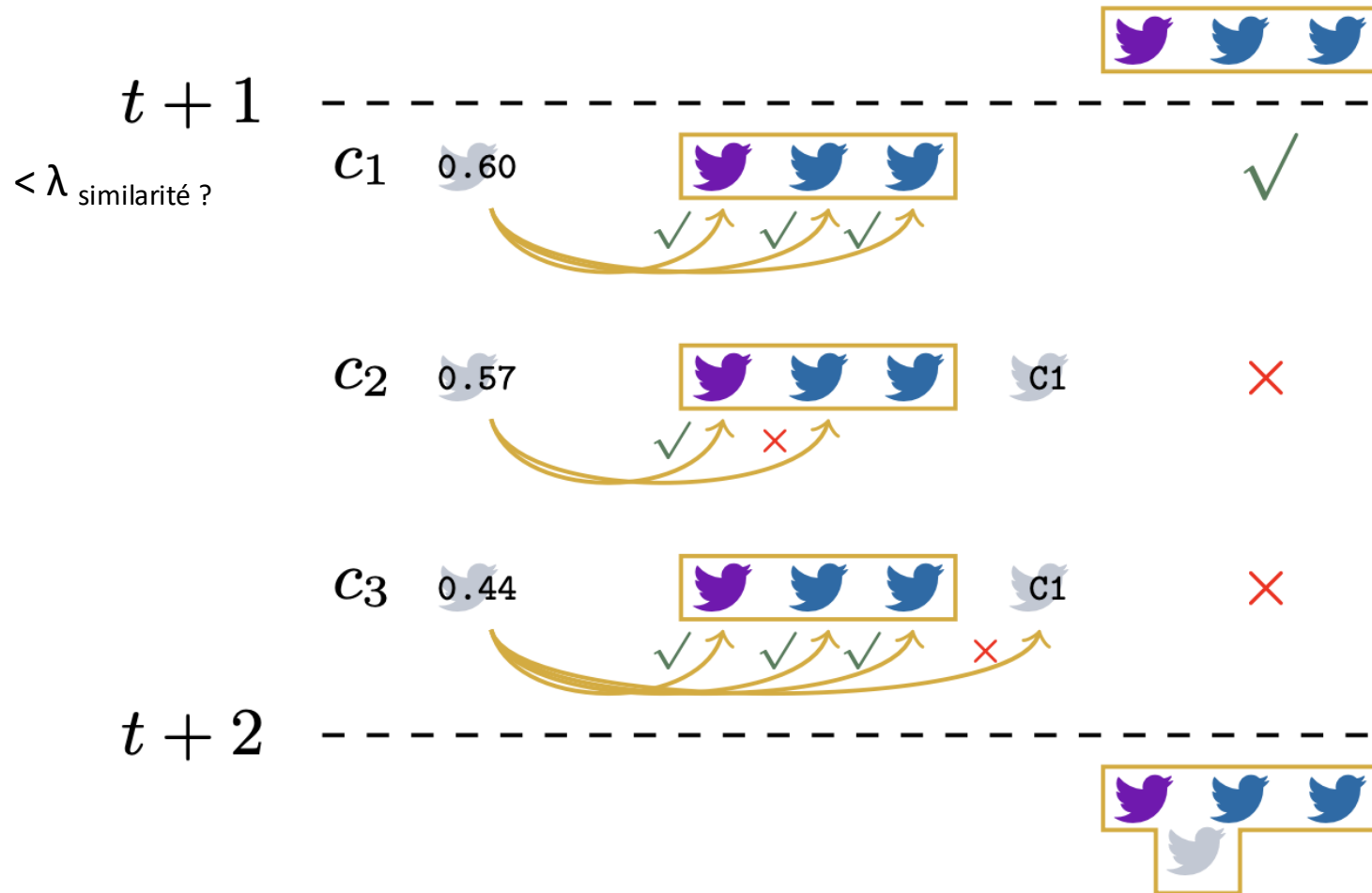


Comment ? Modèle proposé

Stream Start: t_0



Sélection des tweets



La taille des résumés en sortie est calculée automatiquement

Evaluation ?

- Il y a besoin de résumés de référence pour évaluer la qualité de la sortie du modèle (ou pour entrainer des modèles) mais... pas de collections de test

- Proposition:

Documents à résumer Flux de tweets

13 novembre 2015



14 novembre 2015



Résumés de référence

Wikipedia Current Events Portal

13 novembre 2015

1. French police report multiple blasts and gunfire in Paris with at least 26 dead in a restaurant in the 10th arrondissement and an explosion near the Stade de France.
2. Police report the hostage siege is over at the Eagles of Death Metal concert at the Bataclan theatre in the 11th arrondissement. Approximately 100 people are dead in the Bataclan.

14 novembre 2015

1. The President of France François Hollande declares a state of emergency across France.



Quelques résultats

Evaluation automatique

Collection	Model	ROUGE-1 Macro	ROUGE-2 Macro	COS Embed Macro
		F	F	
TES 2012-2016	SEMCOWTS	0.068	0.002	0.686
	TES TSSuBERT-F	0.114	0.021	0.676
	TES TSSuBERT	0.111	0.018	0.741
	ISSt TSSuBERT-F	0.124	0.021	0.656
	ISSt TSSuBERT	0.099	0.013	0.749
ISSumSet	SEMCOWTS	0.363	0.127	0.869
	TES TSSuBERT-F	0.357	0.179	0.849
	TES TSSuBERT	0.256	0.113	0.854
	ISSt TSSuBERT-F	0.382	0.186	0.857
	ISSt TSSuBERT	0.288	0.122	0.880

← Modèle de l'état de l'art

Evaluation manuelle (TES 2012-2016)

Model	Mean
SEMCOWTS	0,076
TES TSSuBERT	0,249
TES TSSuBERT-F	0,132

Synthèse de documents juridiques

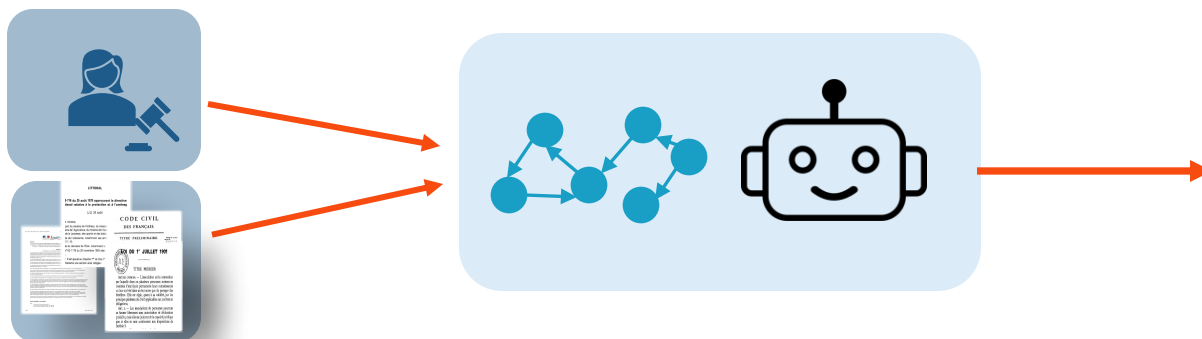
[Travaux de thèse de Nihed Bendahman
Co-encadrement : Gilles Hubert]

Veille juridique

Scenario 2

Résumé
abstractif

Documents juridiques



- LOI DU 1^{er} JUILLET 1901**

Loi n° 77-17 du 6 janvier 1978 - Article 1. Légifrance

<http://www.legifrance.gouv.fr/affichTexteArticle.do?prevision=11101000>

Legifrance gouv
le site officiel de la législation en France

LITTORAL

9-716 du 25 août 1979 **approva**
lional relative à la protection

(J.O. 26 août)

CODE
DES FRA

TITRE PRÉLIMINAIRE
DE LA PUBLICATION
ET DE L'APPLI
EN GÉNÉRAL.

ARTICLE 1.

Les lois sont exécutoires dans tout le territoire français, en vertu de la promulgation qui en est faite par le **PREMIER CONSEIL**.

Elles sont exécutées dans chaque partie de la République, du moment où la promulgation en poura être connue.

La promulgation faite par le **PREMIER CONSEIL** sera réputée connue dans le département où siège le Gouvernement, un jour après celui de la promulgation ; et dans chacun des autres départements, après l'expiration du même délai, augmenté d'autant de jours qu'il y aura de fois dix myriades (environ vingt lieues anciennes) entre la ville où la

Le ministre
port du mi
stre de l'A
de la Jeun
de l'urt
111-15 ;
le du dom
n° 63-1178
;
- Il est ajou
banisme u



Handwritten ledger entries (German):

- 19.07 08.07 Belastung Gutschrift 100,00
- 19.07 11.07 400,00
- 20.07 14.07 83,00
- 20.07 19.07 149,90
- 20.07 21.07 42,02
- 20.07 22.07 108,00

Other visible text: "ausgegeben", "eingetragen", "August", "ausgegeben", "eingetragen", "2.42,00", "Gutschrift", "620,52".

Un syndicat mixte a confié à la société G le lot n° 4, « finition », d'un marché public de travaux ayant pour objet la construction d'un pôle « sport de montagne ». Après la réception des travaux, la société G a saisi le tribunal administratif de Nice d'une demande tendant à la condamnation du syndicat à lui payer la somme de 59 000 euros en réparation du préjudice résultant des difficultés rencontrées lors de l'exécution de ce contrat. Par le jugement attaqué, dont la société relève appel, le tribunal administratif a rejeté cette demande.

Un domaine d'application particulier

Document juridique

Official Journal of the **European Union**
COMMISSION DELEGATED REGULATION (EU) 2019/980 of 14 March 2019 supplementing **Regulation (EU) 2017/1129** of the **European Parliament** and of the **Council** as regards the format, content, scrutiny and approval of the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing **Commission Regulation (EC) No 809/2004** (Text with **EEA** relevance) **THE EUROPEAN COMMISSION**, Having regard to the Treaty on the Functioning of the **European Union**, Having regard to **Regulation (EU) 2017/1129** of the **European Parliament** and of the **Council** of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing **Directive 2003/71/EC** (1), and in particular Article 9(14), paragraphs (1) and (2) of Article 13, Articles 14(3), 15(2) and 20(11) thereof, Whereas: (1) **Regulation (EU) 2017/1129** [...]

1. Vocabulaire très spécifique
2. Les chargés de veille / les juristes intègrent de **nouvelles informations de contexte** dans leurs résumés manuels

Entités
fidèles



The **European Commission** has adopted the following acts : Delegated **Regulation (EU) 2019/980** laying down details of the precise content and format of the prospectus, as well as concerning the scrutiny and approval of the prospectus. Delegated **Regulation (EU) 2019/979** laying down details of the key financial information in the summary of the prospectus, the publication and classification of the prospectus, the advertisement for the securities and the supplement to a prospectus. Delegated **Regulation (EU) 2020/1273** amending and correcting Delegated **Regulation (EU) 2019/980**. Delegated **Regulation (EU) 2020/1272** amending and correcting Delegated **Regulation (EU) 2019/979** [...].

Abstractions

Comment s'en sortent les modèles de langue de résumé abstraktif ?

Document juridique

Official Journal of the **European Union**
COMMISSION DELEGATED REGULATION (EU) 2019/980 of 14 March 2019 supplementing **Regulation (EU) 2017/1129** of the **European Parliament** and of the **Council** as regards the format, content, scrutiny and approval of the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Commission **Regulation (EC) No 809/2004** (Text with **EEA** relevance) **THE EUROPEAN COMMISSION**, Having regard to the Treaty on the Functioning of the **European Union**, Having regard to **Regulation (EU) 2017/1129** of the **European Parliament** and of the **Council** of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing **Directive 2003/71/EC** (1), and in particular Article 9(14), paragraphs (1) and (2) of Article 13, Articles 14(3), 15(2) and 20(11) thereof, Whereas: (1) **Regulation (EU) 2017/1129** [...]

Hallucinations non factuelle

The Commission Delegated **Regulation (EU) 2019/980**, dated 14 March 2019, supplements **Regulation (EU) 2017/1129** of the **European Parliament** and **Council**. It addresses the format, content, scrutiny, and approval of the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, effectively repealing Commission **Regulation (EC) No 809/2004**. It includes different key points: - Different types of prospectuses are subject to specific information requirements depending on the issuer, type of security, and market admission, also mentioned in **Regulation (EU) 2020/1273**. - As in **Regulation 2019/977** Universal registration documents must clearly state whether they have been approved or simply filed with the competent authority. [...]

Hallucination factuelle

Entités fidèles

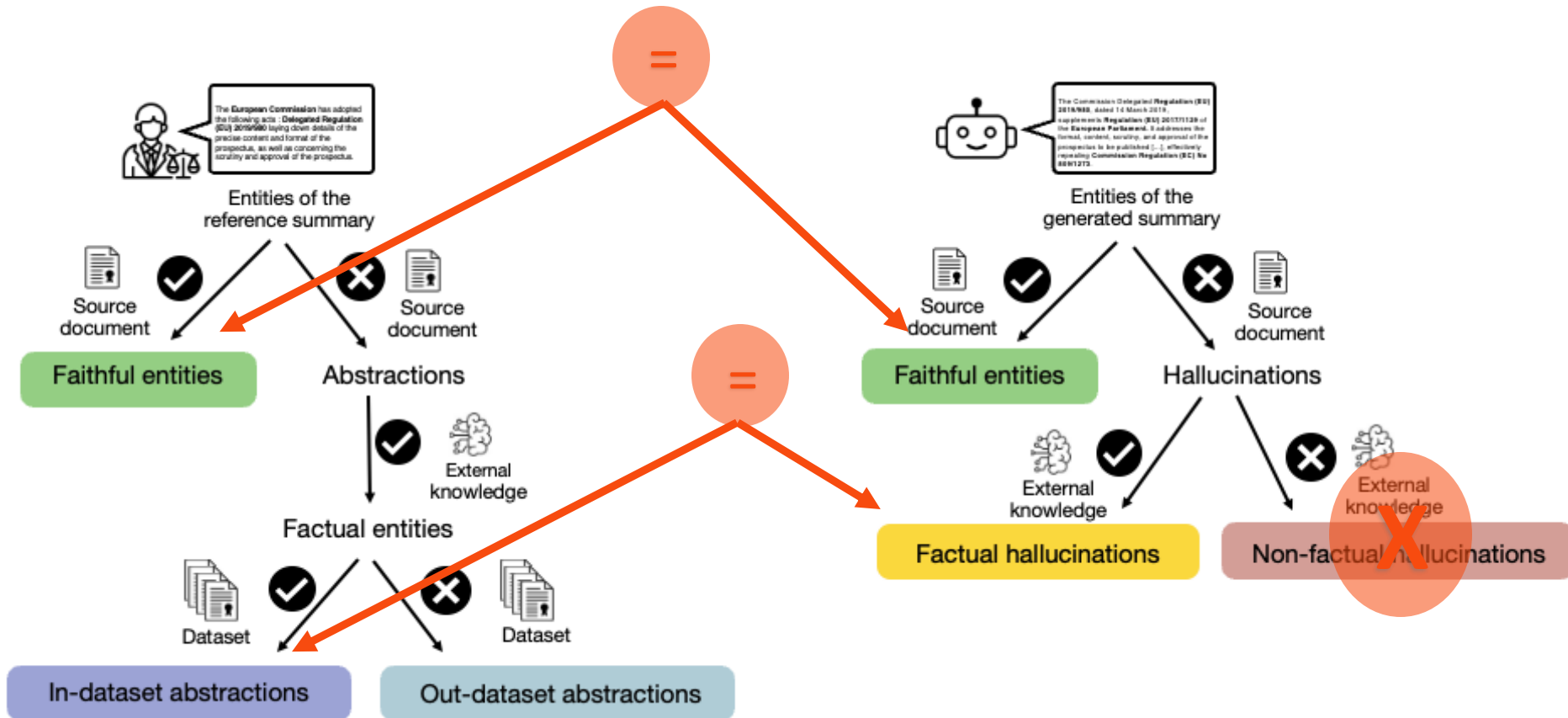
The **European Commission** has adopted the following acts : Delegated **Regulation (EU) 2019/980** laying down details of the precise content and format of the prospectus, as well as concerning the scrutiny and approval of the prospectus. Delegated **Regulation (EU) 2019/979** laying down details of the key financial information in the summary of the prospectus, the publication and classification of the prospectus, the advertisement for the securities and the supplement to a prospectus. Delegated **Regulation (EU) 2020/1273** amending and correcting Delegated **Regulation (EU) 2019/980**. Delegated **Regulation (EU) 2020/1272** amending and correcting Delegated **Regulation (EU) 2019/979** [...].

Abstractions



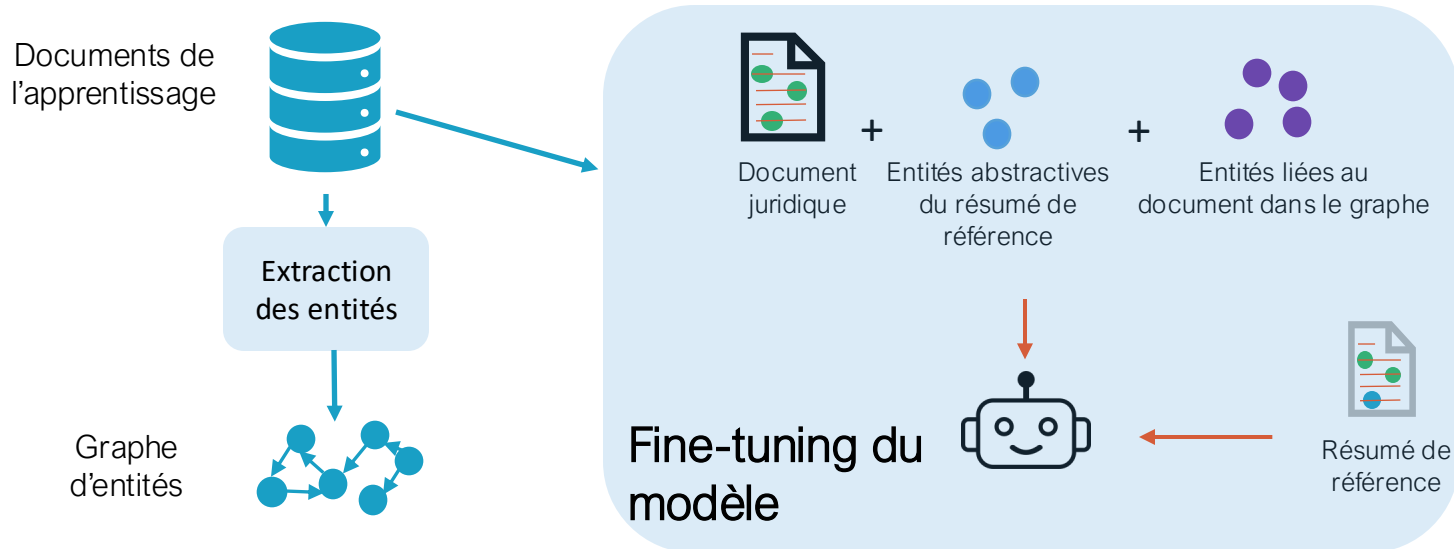
Objectifs sur le résumé abstractif

Se focaliser sur les entités

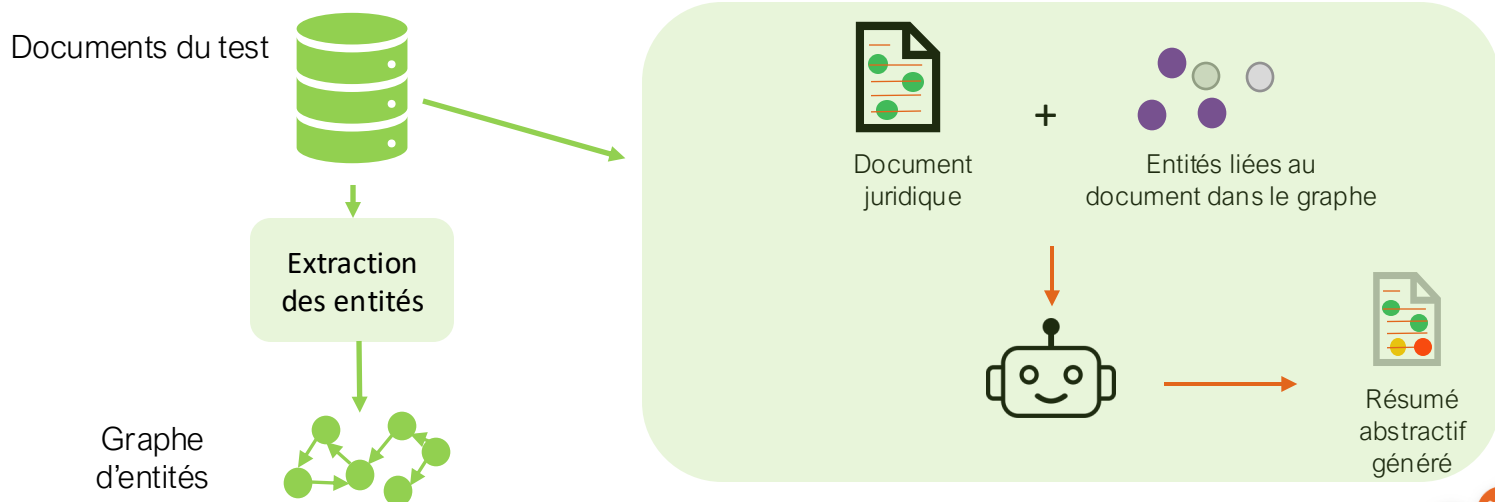


Comment ? Modèle proposé

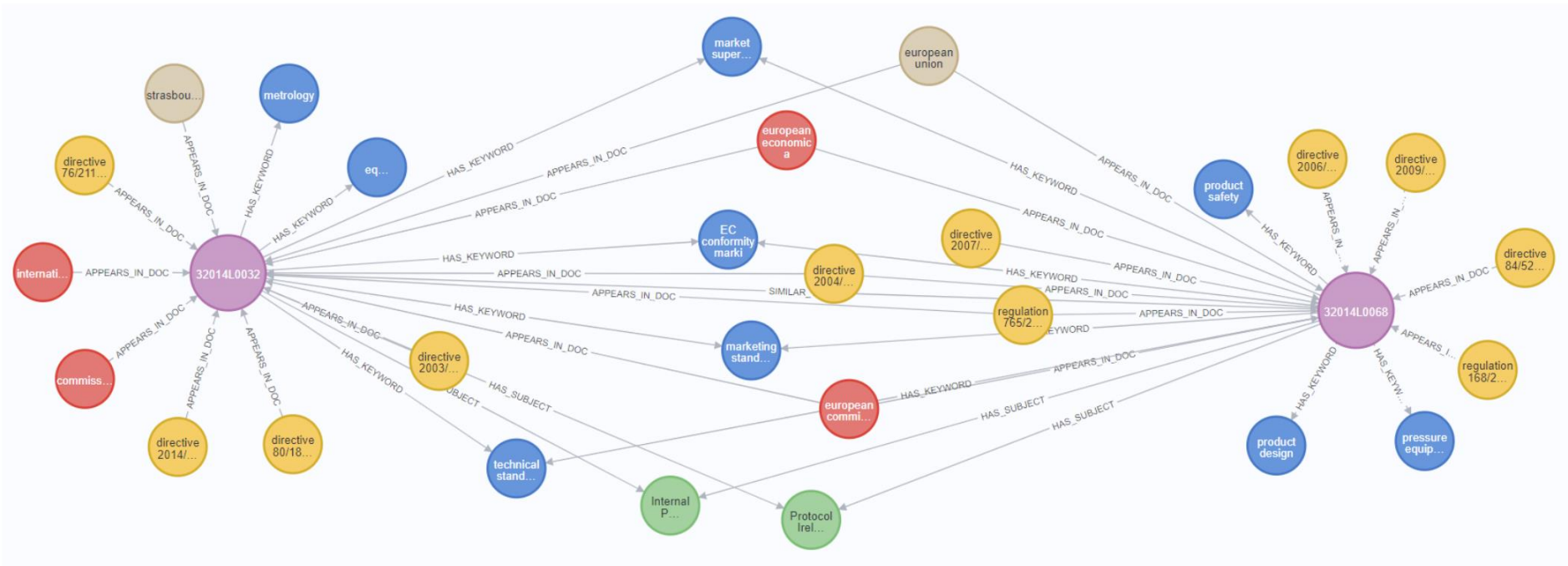
Apprentissage



Inférence



Graphe d'entités



document



sujet



mots-clés



localisation



organisation



entités juridiques

=> Evaluation de plusieurs stratégies de sélection des nœuds

Quelques résultats

Corpus EurLex-SUM

Modèle		Faithfulness ↑	Factual Hallucination ↑	Non Factual Hallucination ↓	Bert-Score ↑	Fact-CC ↑	ROUGE ↑
Modèle de l'état de l'art	ECC	0,21	0,07	0,70	0,84	0,36	0,22
	Oracle	0,21	0,11	0,60	0,86	0,39	0,26
Différents modes d'entraînement	Setting 0	0,17	0,04	0,73	0,83	0,27	0,20
	Setting 1	0,15	0,05	0,78	0,86	0,34	0,23
	Setting 2	0,20	0,08	0,68	0,87	0,39	0,21
	Setting 3	0,20	0,08	0,68	0,86	0,40	0,24

Métriques
orientées entités

Génération de réponses attribuables

[Travaux de thèse d'Hanane Djeddal

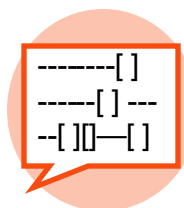
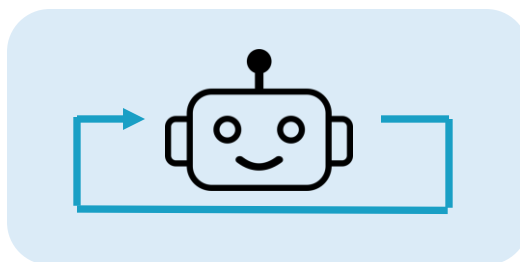
Co-encadrement : Lynda Tamine Lechani, Laure Soulier]

Scenario 3

Requête utilisateur



Corpus



Réponse
générée et
sourcée

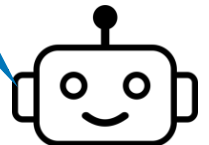
Problématique

- Une nouvelle fois :
 - **Réduire** les hallucinations des LLM et augmenter la **factualité** des résultats
- Piste de solution:
 - travailler sur **l'attribution** des sources dans le texte généré



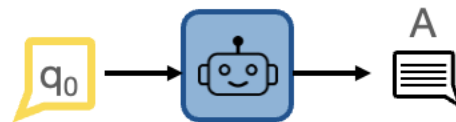
Where do fire ants live?

Fire ants, specifically the little fire ant and the red imported fire ant, live in various regions around the world. The little ant is native to its original range, which includes Africa, North America, Puerto Rico, Cuba, and several Pacific Island groups. They have been accidentally transported to other regions, such as Canada...The red imported fire ant, native to South America, has been introduced to Australia, New Zealand... These ants can be found in various habitats, including rain forests, disturbed areas,...Fire ants are considered one of the world's most invasive species by the International Union for Conservation of Nature (IUCN) **[1, 2, 4]**

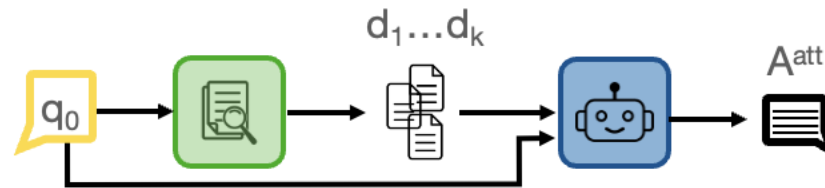


Architectures existantes pour l'attribution

Systèmes de RAG (Retrieval Augmented Generation)



1) G: Generate



2) RTG: Retrieve Then Generate



3) GTR: Generate Then Retrieve



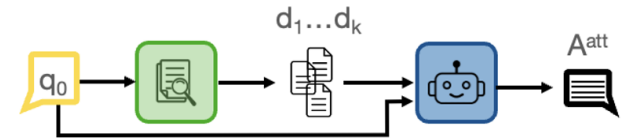
Where do fire ants live?

Limites

1 Retrieve k documents



- d_1 ...been unintentionally transported from its native range to Africa, North America, Puerto Rico, ...
- d_2 ...they can be found in rain forests, in disturbed areas, deserts, grasslands, alongside roads
- d_3 ...has the widest distribution of these, occurring from the Carolinas to California, including Georgia
- d_4 ...is native to South America but it has spread to Australia, New Zealand, several Asian...
- Aspect 1 : geographical distribution
- Aspect 2 : habitats
- Aspect 3 : distribution in the US



2) RTG: Retrieve Then Generate

2 Generate answer based on retrieved documents and initial query

Fire ants, specifically the little fire ant and the red imported fire ant, live in various regions around the world. The little ant **is native to its original range, which includes Africa, North America, Puerto Rico, Cuba, and several Pacific Island groups**. They have been accidentally transported to other regions, such as Canada...The red imported fire ant, native to South America, **has been introduced to Australia, New Zealand...** These ants can be found in various habitats, including rain forests, disturbed areas,...Fire ants are considered one of the world's most invasive species by the International Union for Conservation of Nature (IUCN) [1, 2, 4]

Incorrect

Redundant

General attribution



Where do fire ants live?

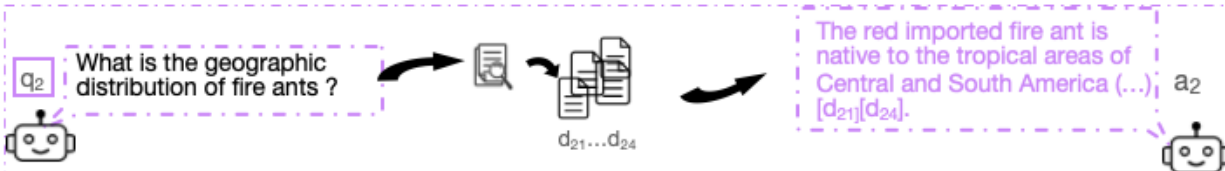
Round 1

- 1 Generate a first sub-query
- 2 Retrieve documents specific to the subquery
- 3 Generate answer snippet that targets the subquery



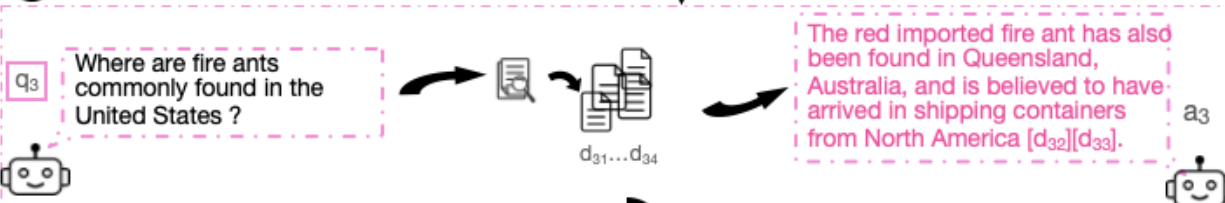
- 4 Refine previous aspect or tackle new one

Round 2



- 5 Iterate

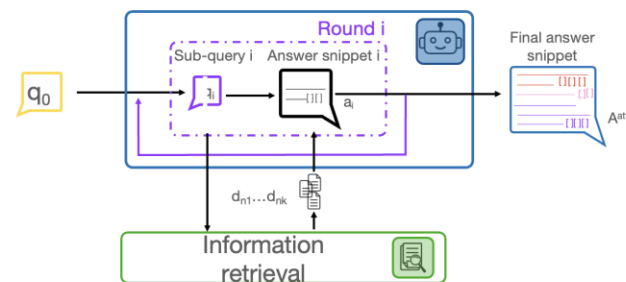
Round 3



- 6 Return the final answer

Fire ants live in a variety of habitats including rain forests, disturbed areas, (...) $[d_{11}][d_{13}][d_{14}]$. The red imported fire ant is native to the tropical areas of Central and South America (...) $[d_{21}][d_{24}]$. The red imported fire ant has also been found in Queensland, Australia, and is believed to have arrived in shipping containers from North America $d_{31}[\dots][d_{3k}]$.

Proposition: Modèle Rag'n'Roll



Quelques résultats

Modèle de l'état
de l'art

Dataset		Correct.							Cit.		
		Bleu	Rouge-L			BertScore			ALCE		AA
			P.	R.	F.	P.	R.	F.	P.	R.	
HAGRID	RTG-ft	7.66	13.70	52.37	18.66	82.05	88.64	85.15	63.71	37.39	37.64
	RAGnRoll-train-wo-query	6.87	15.09	40.79	18.93	81.92	87.39	84.52	<u>68.24</u>	64.52	<u>68.33</u>
	RAGnRoll-QueryFromLLM	11.85	26.2	52.7	29.75	85.52	88.51	86.92	59.2	57.24	57.74
	RAGnRoll-QueryFromStatement	12.72	24.09	53.31	28.81	85.08	89.42	87.13	65.45	58.55	57.79
	RAGnRoll-expanded	14.87	25.41	55.25	30.09	85.53	89.79	87.54	66.93	67.55	63.90
	RAGnRoll-compact	25.26	43.78	53.25	41.91	89.20	90.47	89.69	70.42	67.39	69.4
ASQA	RTG-ft	9.81	18.23	39.78	23.48	83.42	87.42	85.35	53.81	30.16	31.25
	RAGnRoll-train-wo-query	11.03	22.48	30.5	24.28	82.72	85.86	84.24	61.12	57.88	59.25
	RAGnRoll-QueryFromLLM	12.98	32.11	35.48	31.2	85.16	85.18	85.14	53.96	54.818	55.53
	RAGnRoll-QueryFromStatement	14.02	30.8	34.98	30.4	85.21	85.84	85.49	60.48	56.47	56.66
	RAGnRoll-expanded	16.25	30.91	<u>34.6</u>	30.66	85.52	<u>86.3</u>	85.88	60.68	<u>62.67</u>	<u>64.96</u>
	RAGnRoll-compact	18.44	39.16	32.53	32.28	86.64	86.12	86.34	62.15	65.57	69.10

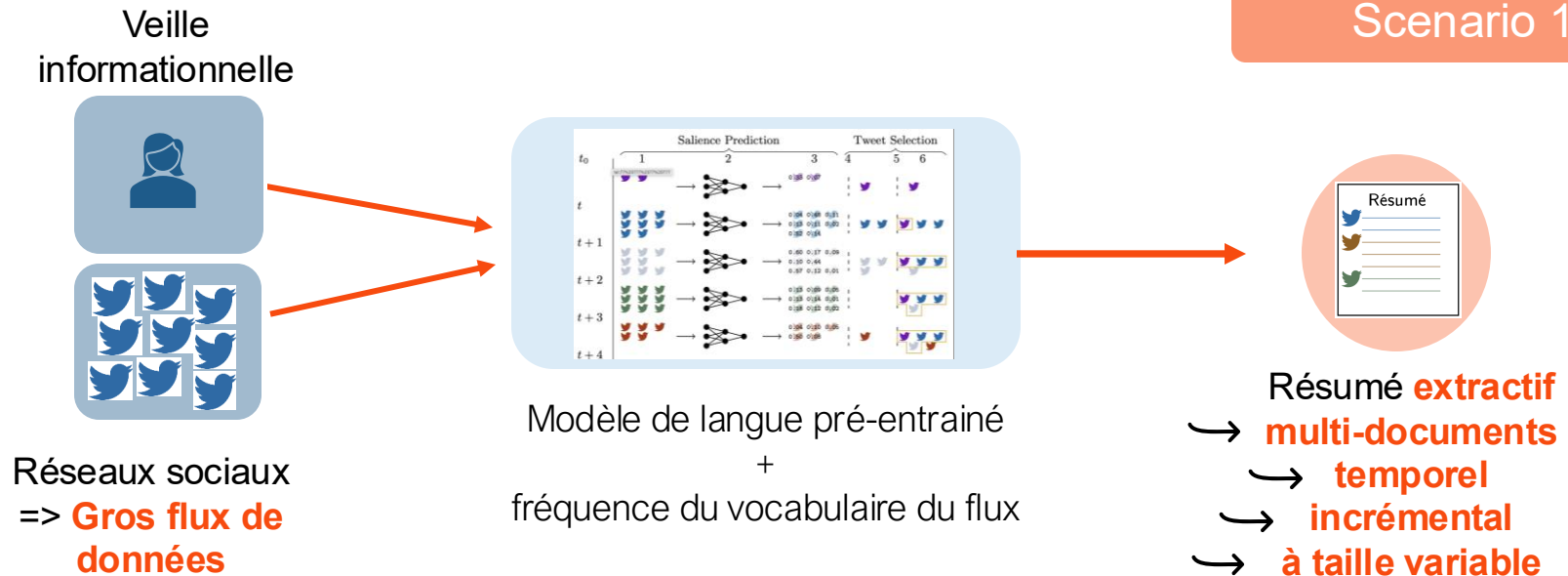
Qualité de la
génération

Qualité des
citations



En résumé ...

En résumé – S’informer sur les réseaux sociaux



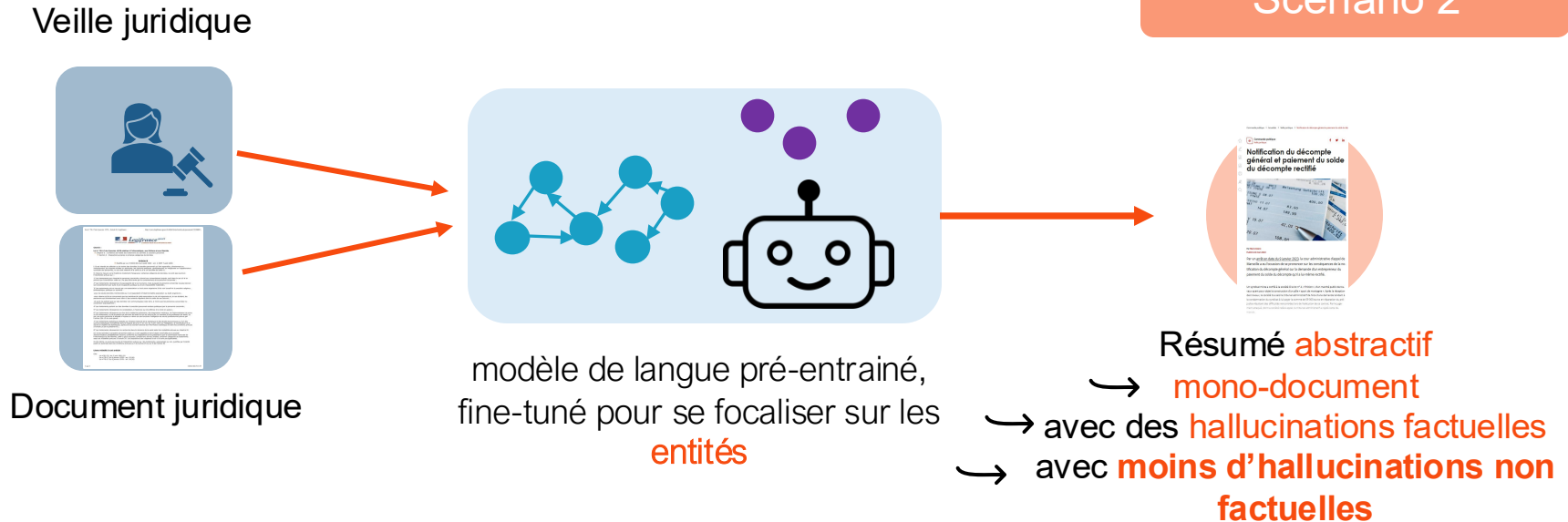
Alexis Dusart, Karen Pinel-Sauvagnat, Gilles Hubert: ISSumSet : a tweet summarization dataset hidden in a TREC track. SAC 2021:665-671

Alexis Dusart, Karen Pinel-Sauvagnat, Gilles Hubert: TSSuBERT: How to Sum Up Multiple Years of Reading in a Few Tweets. ACM Trans. Inf. Syst. 41(4) :109-1:109:33 (2023)

Alexis Dusart, Karen Pinel-Sauvagnat, Gilles Hubert: Exploring unsupervised textual representations generated by neural language models in the context of automatic tweet stream summarization. Online Soc. Networks Media 37-38: 100272 (2023)

En résumé – Synthèse de documents juridiques

Scenario 2

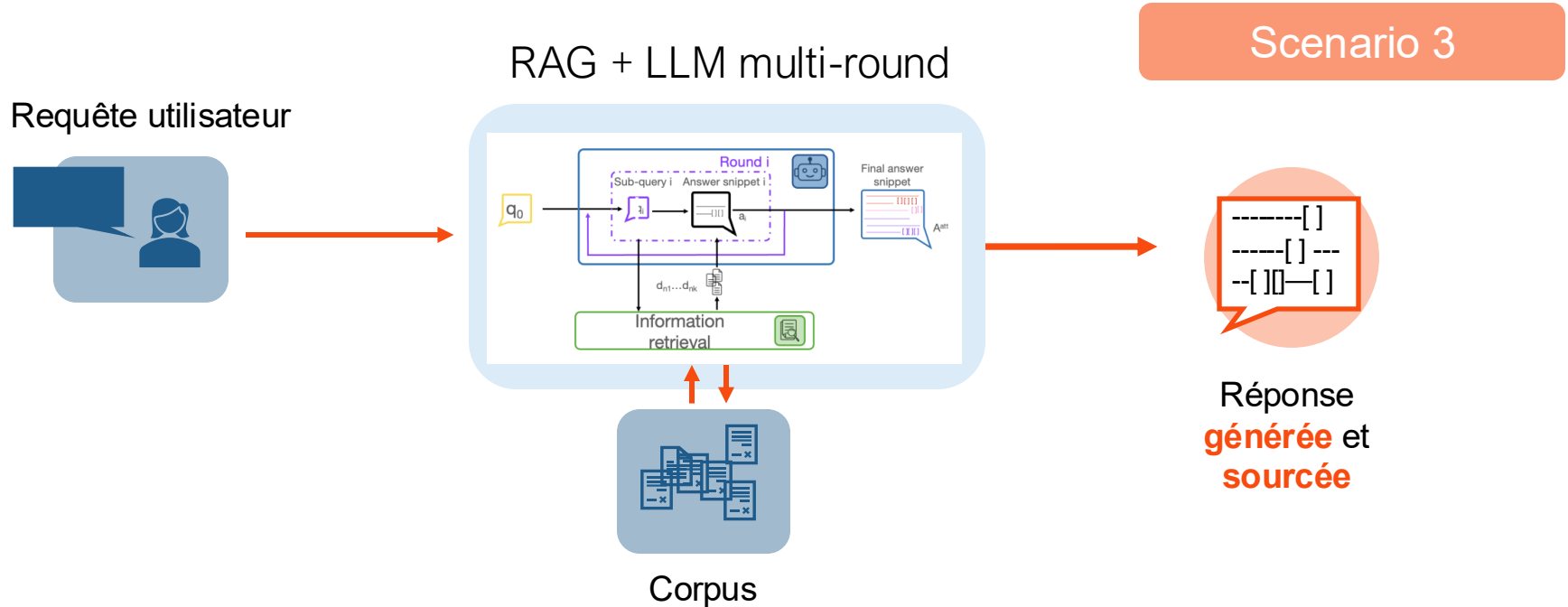


Nihed Bendahman, Karen Pinel-Sauvagnat, Gilles Hubert, Mokhtar Boumedyen Billami : **Not hall hallucinations are good to throw away when it comes to legal abstractive summarization**. NAACL 2025 . Long paper : 5331-5344

Nihed Bendahman, Karen Pinel-Sauvagnat, Gilles Hubert, Mokhtar Boumedyen Billami : **EUR-Lex-Triples: A Legal Relation Extraction Dataset from European Legislation**. TPDL 2025

La suite: travailler sur les triplets entité – relation - entité

En résumé – Génération de réponses attribuables



Hanane Djeddal, Pierre Erbacher, Laure Soulier, Karen Pinel-Sauvagnat, Sophia Katrenko, Lynda Tamine: **Vers des LLMs fiables pour les tâches de la recherche d'information.** CORIA 2024

Hanane Djeddal, Pierre Erbacher, Raouf Toukal, Laure Soulier, Karen Pinel-Sauvagnat, Sophia Katrenko, Lynda Tamine: **An Evaluation Framework for Attributed Information Retrieval using Large Language Models.** CIKM 2024: 5354-5359



Questions ?