Give me your Intentions, I'll Predict Our Actions : A Two-level Classification of Speech Acts for Crisis Management in Social Media

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Urgency detection and speech acts

During crises users express plans, goals, expectations towards the events and towards actions that need to be undertaken.

(1)   a. #Irma Hurricane : "I want to go there to help."
       b. Irma hurricane : where is disaster assistance one month later ?
       c. Emergency heritage at Bordeaux. After the flood, the archaeology lab is looking for volunteers to evacuate collections.

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What kind of speech acts are used in emergency situations ?

Speech acts as attitudes

According to the Austinian initial view, SA are to achieve action rather than conveying information e.g. *I now pronounce you man and wife*

Today : Speech acts can indeed be understood as *attitudes* towards propositional content (PC) :

- ▶ *asserting* : the speaker presents PC as true ;
- ▶ *questioning* the speaker reveals uncertainty towards PC ;
- ▶ *ordering* the PC is asked to be realized
- ▶ *exclamatives*, the speaker reveals some type of subjective evaluation towards PC.

Previous literature on speech acts in social media

- ▶ Previous works on communicative intentions during emergency crises has focused on the correlation between specific topics and SA, e.g. natural disasters use assertions ; comments about celebrities use subjective content (Zhang et al., 2011 ; Vosoughi, 2015 ; Elmadany et al., 2018a ; Saha et al., 2020).

- ▶ NLP-based emergencies detection is a hot topic and several datasets (mainly tweets) have been proposed to account for crisis related phenomena (Imran et al., 2013 ; Mc- Creadie et al., 2019 ; Sarioglu Kayi et al., 2020 ; Kozlowski et al., 2020 ;Zahra et al., 2020).

- ▶ Detecting emergency itself through speech acts has never been attempted.

Urgency categories

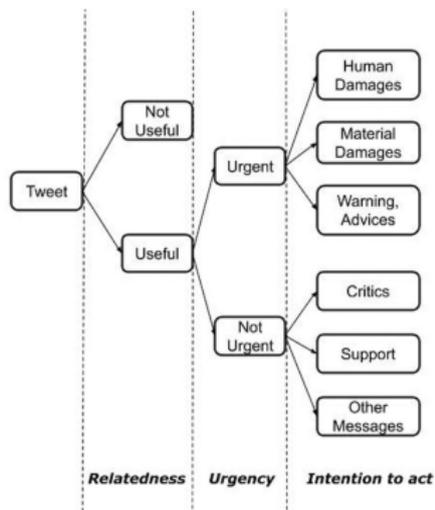We build on urgency categories which we have established in previous work :

Figure 1 – Urgency categories in (Kozlowski et al., 2020)
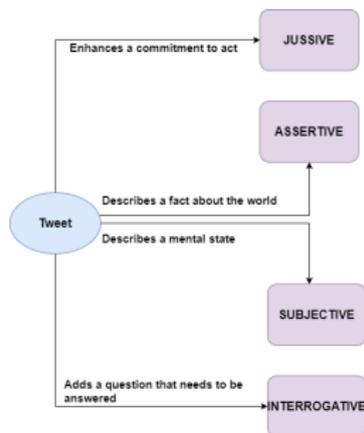
A two-level classification : first level

Figure 2 – A classification for tweets that makes use of four illocutionary categories.

Main difference with the Searlian classification :

► Assertives convey 'objective content'; subjectives convey 'subjective content' and are triggered by attitudes (I think, believe), modals, evaluatives adjectives, adverbs etc (this is the non-veridical or non-factual information).

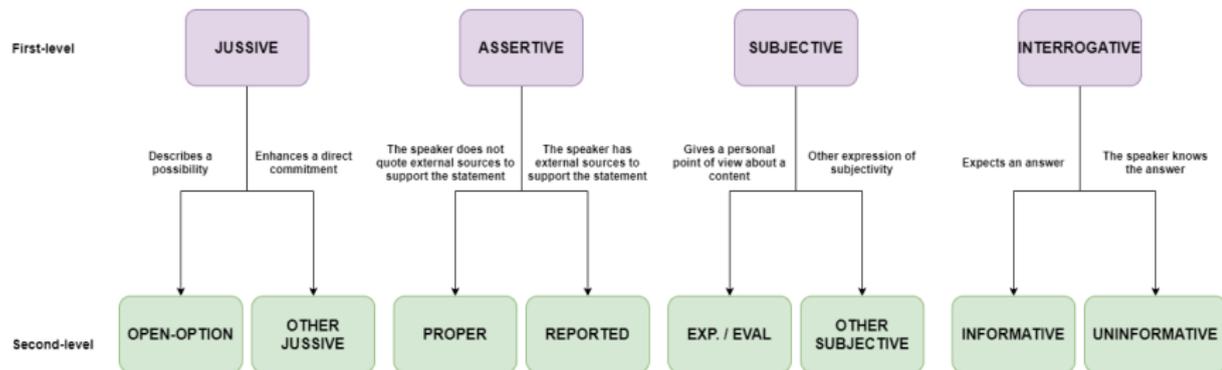# A two-level classification : Second level

Figure 3 – Two-layers annotation for tweets and inner segments.

Data and Annotations

▶ 6,669 tweets about various ecological crises that occur in metropolitan France and its overseas departments (flood, hurricane, storms), **already annotated for urgency**

▶ Pre-existing urgency tags and metadata information have been removed

▶ 448 tweets doubly annotated for SA with Cohen Kappa=0.62

▶ Dependency strength between urgency and SA categories : Cramer's V= .28, df = 2.

	URG	NON URG	NON USEF	TOTAL
ASSERT.	1,802	682	1,506	**3,990**
JUSS.	145	203	321	**669**
SUBJ.	106	406	976	**1,488**
INTERR.	20	58	145	**223**
OTHER	7	52	240	**299**
Total	**2,080**	**1,401**	**3,188**	**6,669**

Figure 4 – Urgency- SA annotation pairs statistics.

Data and Annotations

	URG	NON URG	NON USEF
JUSSIVE			
open-opt.	5.79	8.78	8.41
other.	7. 85	6.96	5.31
ASSERTIVE			
report.	**15.41**	7.84	7.81
proper.	**60.80**	39.63	45.01
INTERROGATIVE			
infor.	0.22	1.66	2.42
uninfor.	1.23	3.90	4.90
SUBJECTIVE			
eval/exp.	6.89	**28.36**	19.14
other.	1.80	2.85	7.00

Figure 5 – Urgency-Second layer SA annotation pairs in percentage.

Automatic SA detection

▶ Supervised learning using 6,370 tweets trained on 80% of the data (the OTHERS class has been removed)

Models	P	R	F
BERT$_{base}$	64.81	58.00	60.80
FlauBERT$_{base}$	72.13	66.19	68.80
CamemBERT$_{base}$	74.16	70.57	71.22
CamemBERT$_{base}$+F	75.26	70.47	72.64
CamemBERT$_{focal}$	75.23	71.62	72.22
CamemBERT$_{focal}$+F	**75.66**	**71.95**	**73.55**

Table 5: Overall SA classification results.

	P	R	F
ASSERT.	87.06	88.72	87.89
JUSS.	75.22	60.28	64.44
SUBJ.	72.93	77.10	66.93
INTERR.	67.44	61.70	74.96
Accuracy=81.87			

Table 6: Best model results per class.

Conclusion

- The first corpus-based study to measure the impact of speech acts in messages posted during crisis events in French social media.
  - Speech acts annotated both at the tweet and subtweet levels
  - Strong correlation (i) between Assertive messages and urgency and (ii) Subjective messages and absence of urgency
- A set of experiments to detect SA at the tweet level
  - Relying on transformer architectures augmented with dedicated features.
  - A first step towards SA-aware urgency detection in social media content.