Emotional Reading of Medical Texts Using Conversational Agents

Gersende Georg
Centre des Cordeliers UMRS 872 Eq. 20
15 rue de l'Ecole de Medecine, Paris, France
French National Authority for Health (HAS)
93218 Saint-Denis La Plaine Cedex
gersende.georg@spim.jussieu.fr

Catherine Pelachaud
University of Paris 8, INRIA Rocquencourt
Mirages 78153 Le Chesnay Cedex, France
catherine.pelachaud@inria.fr

Marc Cavazza
School of Computing
University of Teesside
TS1 3BA Middlesbrough
United Kingdom
m.o.cavazza@tees.ac.uk

Purpose

We present a prototype that helps visualizing the relative importance of sentences extracted from medical texts using Embodied Conversational Agents (ECA). We propose to map rhetorical structures automatically recognized in the Medical documents onto a set of communicative acts controlling the expression of an ECA.

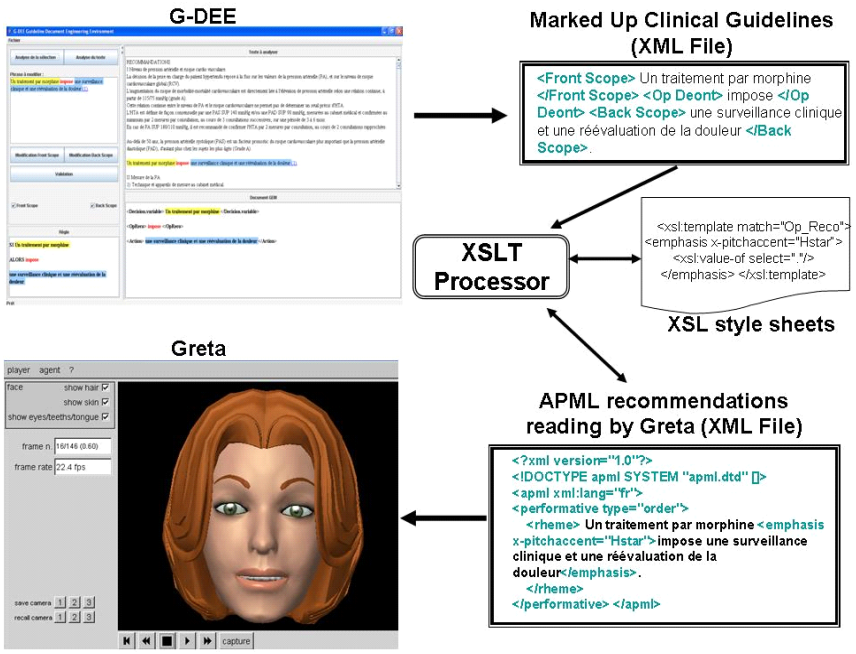
G-DEE

G-DEE supports multiple document processing functions including the automatic recognition of recommendations using shallow NLP techniques recognizing *deontic operators* in medical texts such as "authorize", "forbid", "ought to".

Greta

The Greta agent used in these experiments is a platform developed for research in non-verbal behavior, including an animation system with facial parameters supporting detailed expressive animations synchronized to a TTS system. Greta's animations are controlled using instructions in the APML language. Communicative acts are gathered in classes depending on the information they convey

System Overview



Mapping Rhetorical Structures onto Multimodal Communicative Acts

The dedicated style sheet enables to transform a marked-up recommendation to an APML format that supports the mapping of the "*il est recommandé*" ("it is recommended") deontic verb to the *recommend* performative type.

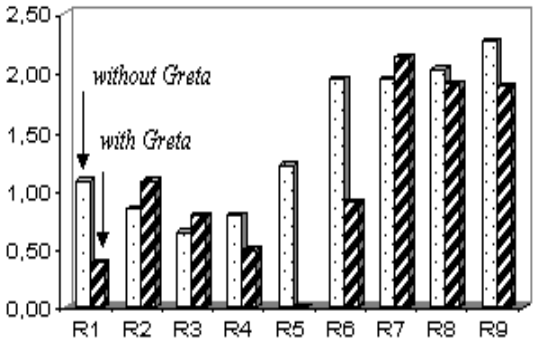
DEONTIC VERB	APML
CAT1 – APML: ORDER	
ordonner (to order) / *imposer* (to impose) / *devra associer* (will have to associate)	**Performative "order"+emphasis/rheme**
interdire (to forbid)	**Performative "order"+certainty "certainty not" + emphasis/rheme**
CAT2 – APML: RECOMMEND	
recommander (to recommend) / *prescrire* (prescribe) / *contre-indiquer* (to counterindicate)	**Performative "recommend"**
déconseiller (to advise not to) / *ne pas recommander* (not recommend) / *ne pas prescrire* (not to prescribe)	**Performative "recommend" + certainty "certainly_not"**
CAT4 – APML: SUGGEST	
être laissé à (to be left to) / *pourrait* (may)	**Performative "suggest"**

```
<apml>
  <performative type="recommend"> <rheme>
    <emphasis>It is recommended</emphasis>
     to perform a venous Doppler examination as part
     of the management of all patients with ulcers of the
     lower limbs </rheme>
  </performative>
</apml>
```

Expression for *recommend*. **Expression for *suggest*.**

Preliminary Evaluation

We observed a very significant effect of Greta on the standard deviation of recommendations' strength, and that effect is more pronounced, and highly significant, for intermediate categories, such as CAT3 (R4), CAT4 (R5) and CAT5 (R6), which are known to be the object of significant debate in working groups.



Conclusions

The system presented here can restore the link between the wording of a recommendation and its intended impact on the reader. It should help selecting the appropriate level of emphasis required, as well as balancing the importance of recommendations across the document as a whole.

Our preliminary results suggest that Greta has an impact of the perception of recommendations strength. The significance of the overall distribution was tested by one-way ANOVA which showed this result to be statistically significant ($P < 0.0474$).

Acknowledgments

Gersende Georg is partly funded through a post-doctoral fellowship from "Region Ile-de-France". We thank all the medical experts from the French National Health Authority (HAS) and Inserm (French National Institute of Health) for their participation in data collection and in evaluation experiments.