

<b>Titre</b>
Accountable recommendations: an interaction-based model

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Axe 2: Interfaces and Interaction with humans

**Description du sujet.** In many digital environments (social networks, ambient intelligence, etc.), human users will face an ever growing number of suggestions, or recommendations. For instance, in a smart house environment, a user may be suggested different policies or actions for energy savings (*e.g.* “you should use your dishwasher later.”), by her personal assistant. A key challenge is then to allow users to understand and even challenge or critic such recommendations. This is what we call *accountable recommendations*.

There are many reasons that justify this need: one is that recommendations that are understood are more likely to be accepted by users in the end. But another, perhaps more compelling reason, is ethical: the ability for users to understand the rationale of a recommendation is arguably a basic requirement of any such environment, otherwise the risk of malicious or biased guidance is real.

One well identified aspect is the fact that these recommendations are based on a large amount of data, that the user may have explicitly provided (expressed preferences, etc.), but in general is not necessarily aware of (traces). But another facet of the problem, much less investigated, is that the underlying algorithms do not necessarily offer any easily understandable description of their process.

The objective of this PhD thesis is to investigate and propose models of recommendations which lend themselves to explanation, verification, and challenge by the users. That is, on top of providing recommendations *e.g.* on an item to get, or a route to follow, or when to use your dishwasher, the system should be able to provide sufficient pieces of evidence to let the user appreciate and challenge this recommendation. Of course, it is usually not a realistic strategy to simply trace or micmic the algorithm procedure, because this output is hardly meaningful for an end-user.

In this thesis, we shall first concentrate on scenarios where recommendations are offered to a user on the basis of learned or acquired preferences, as in our example for energy saving in a smart house. The objective will be to develop a

model of accountable recommendations, and to implement this model in a specific scenario. For producing recommendations, we envision the use of embodied conversational agent, which will help users to understand, explore, and challenge those recommendations. This will be done by presenting in a suitable manner the relevant piece of information to the user, by understanding user's feedback, and by guiding her through those recommendations (for instance by presenting alternative recommendations). In order to do so, the embodied conversational agent will use planning techniques to guide the conversation, in particular based on intentional notions. Importantly, the agent will also need to assess the user's own understanding of the decision problem, and to act based on that. This may involve also modelling emotions (like doubt). We shall make use of the Greta platform [2], which already includes facilities like an intent planner, a dialog manager and can handle emotional notions as well.

**Références.** Here are a few references on the subject:

1. C. A. Thompson, M. H. Goker and P. Langley. "A Personalized System for Conversational Recommendations", *JAIR*, Volume 21, pages 393-428, 2004
2. E. Bevacqua, K. Prepin, R. Niewiadomski, E. de Sevin, C. Pelachaud, GRETA: Towards an Interactive Conversational Virtual Companion, in *Artificial Companions in Society: Perspectives on the Present and Future*, Eds Y. Wilks, J. Benjamins, pp. 143-156, 2010
3. Christophe Labreuche, Nicolas Maudet, Wassila Ouerdane, Simon Parsons: A Dialogue Game for Recommendation with Adaptive Preference Models. *AAMAS 2015*: 959-967
4. Paolo Viappiani, Pearl Pu, Boi Faltings: Preference-based search with adaptive recommendations. *AI Communications* 21(2-3): 155-175 (2008)
5. G. Georg, M. Cavazza, C. Pelachaud, Visualizing the Importance of Medical Recommendations with Conversational Agents, *Intelligent Virtual Agents, IVA'08*, Tokyo, September 2008.