Challenges in argumentation and dialogue for autonomous, multi-party health coaching

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Abstract. We examine in this abstract several key challenges related to the deployment of computational models of argument and dialogue in the context of multi-party health coaching.

Keywords. Medical dialogue, medical argumentation, health coaching

1. Introduction

Council of Coaches[2], a project funded under the European Union's Horizon-2020 framework, aims to develop an autonomous council to assist users in achieving their health goals [1]. Computational models of argument and dialogue will underpin the core reasoning and communication abilities of the coaches that make up the council. In this abstract, we outline several challenges and issues that have been identified in developing these models, why these issues are important, and, where relevant, a brief examination of the steps we propose to take in addressing them. It should be noted that these challenges are non-exhaustive and we have instead chosen to highlight what we consider to have the highest priority with respect to finding solutions.

2. The challenges

2.1. Handling disagreement between coaches

It is necessary for an interdisciplinary council of coaches to produce conflict between the coaches, so as to present different perspectives on a topic - for instance, losing weight

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can be achieved by eating less, and/or by being more active. While conflict such as this is beneficial, by assisting the user in playing out conflicts they might have in their head, other types of conflict require more careful consideration - for instance, one coach recommending a user take more exercise, while another recommends they rest. Neither coach is wrong *per se*, but the user can only accept advice from one.

Handling conflict between coaches requires careful balance between realistic interaction and the user having confidence in the system. If the council were to always present a united position (by resolving conflict internally) then the user would start to question the need for a council in the first place; however, if the coaches are always publicly disagreeing, then it may raise a doubt in the user's mind as to the veracity of the advice.

2.2. Trust: not too little, not too much

A user must be able to trust the advice given to them by the coaches; otherwise, the system will be of little or no use. Ways of building trust between the coaches and a user can include relevance of arguments [2] and being able to reference their sources of information – something that can, at least in part, be achived through the use of argumentation schemes [3] such as Argument from Expert Opinion.

Trust is not just important on a practical level. It is also necessary to consider social factors. For instance, attempting to build a rapport with the user through nuances of dialogue, and ensuring that dialogical interactions are as naturalistic as possible.

While it is important for the user to trust the information given to it by the coaches in the council, it is equally important they do not put too much trust in them — the council should not be (and does not intend to be) a replacement for relevant healthcare professionals. It is therefore essential to find the correct balance between offering trustworthy advice, and avoiding user over-reliance on the system.

2.3. Resolving conflict in medical knowledge

Medical knowledge will always produce conflicts, especially between general medical advice and an individual patient's medical situation (e.g. taking 10,000 steps per day, but the patient is non-ambulatory). This type of conflict should be resolved before the knowledge is consumed by the coaches in the council and presented to the user.

Resolving such conflicts can be achieved through using values and/or preferences. In value-based argumentation, values are assigned to arguments with a preference ordering then applied to those values. Arguments that promote more-preferred values are then potentially accepted over conflicting arguments that promoted less-preferred values [4].

A framework such as ASPIC$^+$ [5,6] allows knowledge base and rule preferences to be expressed; processing this representation with software such as The Online Argument Structures Tool (TOAST) [7] will then reveal the "acceptable" knowledge.

3. Summary and conclusions

We have in this short abstract outlined some of the key challenges with deploying computational models of argument and dialogue in a multi-party health coaching platform. The challenges presented are non-exhaustive, however these are the ones we have identified as being of highest priority when considering the use of computational models of argumentation and dialogue in the context of autonomous health coaching.

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References

[1] H. op den Akker, R. op den Akker, T. Beinema, O. Banos, D. Heylen, B. Bedsted, C. Pelachaud, V. Traver Salcedo, S. Kyriazakos, and H. Hermens, "Council of Coaches – a novel holistic behavior change coaching approach," in *International Conference on Information and Communication Technologies for Ageing Well and e-Health*, 2018.

[2] F. Paglieri and C. Castelfranchi, "Trust, relevance and arguments," *Argument & Computation*, vol. 5, no. 2–3, pp. 216–236, 2014.

[3] D. Walton, C. Reed, and F. Macagno, *Argumentation Schemes*. Cambridge University Press, 2008.

[4] T. Bench-Capon, "Value-based argumentation frameworks," in *Proceedings of the 9th International Workshop on Nonmonotonic Reasoning*, (Toulouse, France), pp. 444–453, 2002.

[5] H. Prakken, "An abstract framework for argumentation with structure arguments," *Argument & Computation*, vol. 1, no. 2, pp. 93–124, 2010.

[6] S. Modgil and H. Prakken, "The ASPIC+ framework for structured argumentation: a tutorial," *Argument & Computation*, vol. 5, no. 1, pp. 31–62, 2014.

[7] M. Snaith and C. Reed, "TOAST: online ASPIC+ implementation," in *Proceedings of the Fourth International Conference on Computational Models of Argument (COMMA 2012)* (B. Verheij, S. Szeider, and S. Woltran, eds.), (Vienna, Austria), pp. 509–510, IOS Press, 2012.