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Adaptive Generation in Dialogue Systems Using Dynamic User Modeling

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Abstract [Full Text](#) [Authors](#)

We address the problem of dynamically modeling and adapting to unknown users in resource-scarce domains in the context of interactive spoken dialogue systems. As an example, we show how a system can learn to choose referring expressions to refer to domain entities for users with different levels of domain expertise, and

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whose domain knowledge is initially unknown to the system. We approach this problem using a three step process: collecting data using a Wizard-of-Oz method, building simulated users, and learning to model and adapt to users using Reinforcement Learning techniques.

We show that by using only a small corpus of non-adaptive dialogues and user knowledge profiles it is possible to learn an adaptive user modeling policy using a sense-predict-adapt approach. Our evaluation results show that the learned user modeling and adaptation strategies performed better in terms of adaptation than some simple hand-coded baseline policies, with both simulated and real users. With real users, the learned policy produced around a 20% increase in adaptation in comparison to an adaptive hand-coded baseline. We also show that adaptation to users' domain knowledge results in improving task success (99.47% for the learned policy vs. 84.7% for a hand-coded baseline) and reducing dialogue time of the conversation (11% relative difference). We also compared the learned policy to a variety of carefully hand-crafted adaptive policies that employ the user knowledge profiles to adapt their choices of referring expressions throughout a conversation. We show that the learned policy generalises better to unseen user profiles than these hand-coded policies, while having comparable performance on known user profiles.


We discuss the overall advantages of this method and how it can be extended to other levels of adaptation such as content selection and dialogue management, and to other domains where adapting to users' domain knowledge is useful, such as travel and healthcare.


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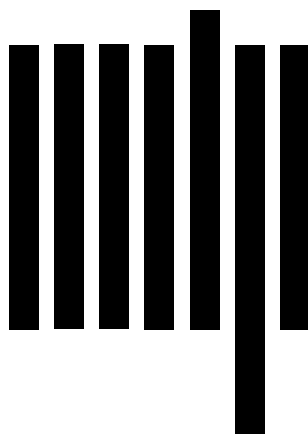
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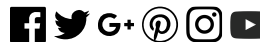
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