Mixed-initiative Human-Computer Dialogs through Natural Language

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Specification and implementation of flexible human-computer dialogs is challenging because of the complexity involved in rendering the dialog responsive to a vast number of varied paths through which users might desire to complete the dialog. To address this problem, we developed a toolkit for modeling and implementing task-based, mixed-initiative dialogs based on metaphors from lambda calculus. Our toolkit can automatically operationalize a dialog that involves multiple prompts and/or sub-dialogs, given a high-level dialog specification of it. Our current research entails incorporating the use of natural language to make the flexibility in communicating user utterances commensurate with that in dialog completion paths.

Available at: https://bitbucket.org/jwb_research/

Motivation and Results: Enabling Naturalistic Dialog

- The Subway dialog above illustrates a human-computer mixed-initiative interaction that, due to the complexity and variability of the dialog, is not possible to realize with other dialog systems today. Trying to mix even 3 questions results in 8191 possible unique dialog interactions.
- Line (1) starts with a simple prompt for sub or salad and (2) shows the user responding directly to the prompt. This is the extent of flexibility (completely fixed) of most dialog systems today.
- Line (3) shows the system soliciting for the next item in a script, sandwich size, but in (4), the user responds to a different but forthcoming solicitation for takeout. This out-of-turn interaction is a form of mixed-initiative interaction (MII) where the user and the system engage as equal participants in dialog.
- In (5), the system again solicits for the unanswered sandwich size and in (6), the user responds to a different but forthcoming solicitation for takeout. This out-of-turn interaction is a form of mixed-initiative interaction (MII) where the user and the system engage as equal participants in dialog.
- In (7), the system again solicits for the unanswered sandwich size and in (6), the user responds to a different but forthcoming solicitation for takeout. This out-of-turn interaction is a form of mixed-initiative interaction (MII) where the user and the system engage as equal participants in dialog.
- In (11), the system again solicits for the unanswered sandwich size and in (6), the user responds to a different but forthcoming solicitation for takeout. This out-of-turn interaction is a form of mixed-initiative interaction (MII) where the user and the system engage as equal participants in dialog.

References