Modeling and Operationalizing Flexible Human-Computer Dialogs

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Modeling and Operationalizing Flexible Human-Computer Dialogs

Josh W. Buck
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Abstract
We demonstrate a tool for rapidly prototyping dialog-based systems for interactive use. The tool enables a dialog designer to evaluate a variety of dialogs without having to program each individual dialog, and provides a proof-of-concept for our approach to mixed-initiative dialog modeling and implementation. Applications of our tool can be applied to human-computer dialogs common in automated teller machines (ATMs), kiosks, personal assistants, and online forms including course scheduling.

Implementation
- We use concepts from programming languages, such as curry and partial function application, to achieve flexible dialog evaluation and out-of-turn dialog interaction
- Implementation permits
  ○ non-programmers to prototype and design dialogs
  ○ running a server to evaluate (stage) a dialog with clients
  ○ users to participate in the dialog via messaging client
- Dialog engine implementation is C++ with QT for cross platform applications
- Implementation is packaged as a software toolkit for rapidly prototyping and evaluated dialogs

Human-Computer Dialog for Course Scheduling

(1) Avatar: Welcome to the Course Registration System. For which semester would you like to register?
(2) User: Spring 2016.
(3) Avatar: From which department would you like to take a class? (Example: Mathematics)
(4) User: Actually, I need an afternoon class.
(5) Avatar: Okay, an afternoon class. From which department would you like to take a class?
   (Example: Mathematics)
(6) User: Well that depends on which departments have courses that satisfy the natural science requirement and that offer courses without a prerequisite.
(7) Avatar: Chemistry, Biology, Geology and Physics are the only departments that do so.
(8) User: Physics is the department I want.
(9) Avatar: There is only one course, PHY 100, that satisfies the natural science requirement and does not have a prerequisite. Only sections 01 and 02 are offered in the afternoon.

Publications

Purpose
- Allow designers to create flexible dialogs where clients are equal participants with the computer and can steer the direction of the dialog
- Designers, without programming, can specify human-computer mixed-initiative dialogs using a visual or textual application
- Using arrow connections and evaluation mnemonics, designers can change the permitted order(s) of dialog evaluation without moving dialog content, creating multiple dialogs from a single specification
- Dialog evaluation model supports choosing from all possible sets of orderings/combinations of client user responses
- User studies can be simulated without needing to develop an actual dialog system