What Should I Do Now? Supporting Progress in a Serious Game.

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Abstract

We present two dialogue systems developed to support chating with French speaking virtual characters in the context of a serious game: one hybrid statistical/symbolic and one purely statistical. The player is guided in the quest by different interactions including twelve distinct dialogs with different virtual characters.

1 Introduction

We present two state-of-the art dialogue systems. The first system (H) is a hybrid approach that combines an information-state dialogue manager (Burke et al., 2003) with a classifier for interpreting the players' phrases. The second system (QA) is a question/answering model which predicts the system dialog move based on a player's utterance (Gandhe et al., 2011). Both systems use a generation-by-selection strategy [1]. While previous work has focused on relatively short dialogs in a static setting, we consider longer interactions where dialogs occur in a setting that dynamically evolves as the game unfolds. Our conversational agents interact in French with virtual characters (VCs) in the context of the serious game Mission Plastechnologie (MP). In Section 2, we present the MP game and the dialogue strategies. Section 3 presents the two dialog systems. Finally we present a brief discussion in Section 4.

[1]The system's utterances are selected from a corpus annotated with system dialog moves

2 Dialogues in the MP Game

The MP game is a multi-player quest where 3 teenagers seek to build a joystick in order to free their uncle trapped in a video game [2]. To build this joystick, the player (who alternatively represents anyone of these three teenagers) must explore a plastic factory and interact with different VCs through twelve distinct dialogs, each of them occurring in a different part of the virtual world with different goals to be achieved. We identified four main dialog strategies, one general and three specific, and used these to define the plans guiding the rule-based engine in the H system. The general strategy is for information-seeking, the player looks for information about how to achieved some game-goals and the system provides this information. The specific strategies covers a request for pursuing a goal, a confirmation that a task has been accomplished and a negociation step.

3 Dialogue Systems

The game and the two dialog systems built were integrated as agents within the Open Agent Architecture (Cheyer and Martin, 2001). Both systems access a database for starting the appropriate subdialogs at the appropriate place in the virtual world; and for simultaneously storing all interactions in the database.

3.1 The Hybrid Dialogue System

The H system combines an interpreter, a rule based, Information State Approach dialog manager,

[2]The MP game was created by Artefacto, http://www.artefacto.fr/index_ok.htm

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a generator and the game/dialog communication components.

The Interpreter Module The interpreter is a Logistic-Regression classifier which maps the player's utterance to a dialog move. The features used for training are the four previous system moves and the words filtered by tf*idf (Rojas-Barahona et al., 2012a). The best prediction given by the classifier is matched against the expected move determined by the *last move* stored in the information-state. In case of a mismatch, the interpreter selects a valid move in the current context and updates the information state with this move.

The Dialog Manager We designed a plan for each dialog strategy and extended Midiki (Burke et al., 2003) to support the OAA architecture and access the database with the configuration of the different dialogs in the game. Each time a new dialog is launched, the information state is loaded with the corresponding context (e.g., speakers, list of goals to be discussed) and the plan modeling the corresponding dialog strategy. We implemented a set of update and selection rules for integrating players' moves, handling the information-state and for preparing the agenda according to the plan. Once the system move has been selected, the Generator searches an appropriate verbalisation.

The Generator Given the system dialog move predicted by the dialog manager and the identifier of the current dialog, the generator picks randomly from the annotated corpus an utterance with these dialog move for that dialog identifier. In addition, propositional questions (i.e., proposals by the system to discuss additional topics) were annotated with their respective dialog goals. For example, Samir's sentence: *Are you interested in hearing about my job, the people that work here or the security policies?*, was annotated with the goals: *job*, *staff* and *security_policies*. For these dialog acts, the generator checks the list of current missing goals so as to retrieve an appropriate propositional question. In this way, the system can coherently direct the player by suggesting possible topics without using vague and repetitive sentences such as *Would you like to know more?*

3.2 The QA System

The QA system combines a Logistic-Regression classifier that matches players' turns to system dialog moves with the same generation-by-selection algorithm used in the H system. This classifier has been trained with the same features used for training the interpreter in the H system. Like the H system, the QA dialog system maintains a constant interaction with the game to allow for the game coherence and continuity.

4 Discussion

We have presented two system architectures for conversational agents situated in a serious game. While the QA system simply matches the player's input to a system response, the H system has a much more elaborate dialog managment policy including re-interpretation and the use of game and dialog history information, to guide the dialog. As a result, the QA dialogs are generally more spontaneous, giving the player more initiative whereas the H system enforces a more System-Driven dialog strategy thereby guiding the player through the game. A detailed comparison and evaluation of these two systems has been reported in (Rojas Barahona et al., 2012b)[3]

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