Persona-AIML: An Architecture for Developing Chatterbots with Personality

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Abstract

This work presents the Persona-AIML architecture for the creation of chatterbots in AIML (Artificial Intelligence Markup Language) with personality. It is a flexible architecture that allows the use of different models of personality in the construction of chatterbots. Tests with the prototype revealed satisfactory and very encouraging results.

1. Introduction

Chatterbots can facilitate the process of human computer interaction and are also able to explore and influence the user's behavior [1]. Recent studies have showed the importance of personality for improving the performance of computer systems [2]. Hence, it is of great interest the construction of chatterbots capable of bearing personality during interactions with users.

This work presents Persona-AIML [3; 4], an architecture for the creation of chatterbots with personality in AIML (Artificial Intelligence Markup Language) [5]. This is a flexible architecture that allows the use of different models of personality in the construction of chatterbots.

Preliminary experiments revealed satisfactory and very encouraging results in what concerns the coherence of the chatterbot's behavior regarding the pre-defined personality.

2. Models of Personality

Computational models of personality are in general adapted from some Psychology model or theory. The following theories and models have been used in the development of computational models of personality: Theory of Traits, the Five Factors Model, Theory of Social Learning, and the OCC Model [3].

Building on this theoretical basis, several personality models for intelligent agents have been proposed (e.g., [2; 6]). Although these models have presented satisfactory results, each one was developed for a specific application (i.e., there is no general purpose model).

Among the analyzed chatterbots with personality we highlighted ELIZA [7], whose personality is embedded in the dialog's patterns. Despite the considerable advances in the area, modern chatterbots still hardcode personality features. They do not offer components for the flexible creation of personality models (see [3; 4] for further details).

3. The Persona-AIML Architecture

Considering the drawbacks of existing solutions, The Persona-AIML counts on four components (Figure 1): Categories Base, Personality Component, Dialogue Log, and Reasoning Component.

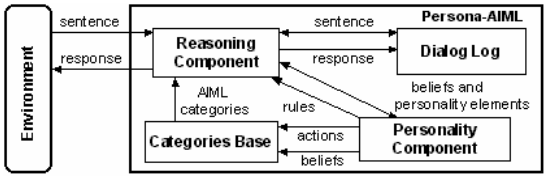

Figure 1 – Persona-AIML Architecture

The Categories Base contains AIML categories (input-output patterns). The Personality Component defines the beliefs, the personality elements, and the rules that determine chatterbot's behavior. The Dialogue Log registers the conversation with the user, so that its context can be tracked.

The Reasoning Component identifies the user's sentence category (based on the Categories Base), verifies the rules in the Personality Component, and then determines the response to the user.

In our architecture, it is possible to describe the following elements: attitudes, emotions, mood, physical states and traits. These personality elements were chosen based on previous studies (section 2), as well as on the works of Frijda [8] and Brave and Nass [9]. However, different from the investigated models, the elements in our architecture present the following characteristics: (1) rules can be directly associated to personality elements, thus facilitating the construction and maintenance of the chatterbot's rules base; (2) the intensity of each element can be defined by an expression including other elements; and (3) specific

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rules for *attitudes* and *emotions* can be constructed for a particular user or for a group of users (e.g., teachers in a distance learning environment).

4. Experiments and Results

In order to validate the Persona-AIML, we implemented a prototype with a categories base in Portuguese language. We adapted the Big Five model, based on the Theory of Traits [10].

Our chatterbot ran in IRC (Internet Relay Chat) environments and in the Web during one week, and it was accessed by (about) 80 users. We verified the following chatterbot's behaviors: (1) it only searches the Internet for answering users' doubts in case he likes the user; (2) it only answers personal questions in case it is happy. By considering these behaviors, the following elements were defined: to like (attitude), happiness (mood) and socialization level (the trait).

Figure 2 presents a segment of dialogue with the implemented prototype. The bot starts the dialogue with the the attitude element set to 'like' the user. In this segment of dialogue, the user attacks the robot (line 3), triggering a rule that modifies the attitude element of the chatterbot to dislike the user. A second rule defines that it will not answer the user's doubt while it is upset with the user (line 6). Finally, other rules define that the bot will only like the user again in case the user apologizes, what occurs in line 7.

user	What do you know?
bot	Well, I could say that it´s you who is teaching me, [*user name*]
user	Aha so you're stupid
bot	I am upset, and i won't talk to you again until you apologize
...	
user	I´d like to know about cars
bot	I won´t answer until you apologize
user	Ok. i am sorry
bot	I accept your apologies
user	What do you know about cars?
bot	There are some interesting sites about cars, click here

Figure 2 - Segment of dialogue with a user

5. Conclusions and Future Work

This work presents the Persona-AIML architecture for the development of chatterbots with personality. Our main aim was to fill in a gap in this research area by providing a flexible architecture that allows the creation of different and coherent personality models. Moreover, the architecture favors the reuse of AIML bases. Preliminary tests with the prototype showed the effectiveness of the proposed architecture.

The main contributions of this work are: the development of a generic architecture for the creation of personality models; the integration of personality in AIML chatterbots; and the application of an architecture of intelligent agents for chatterbots.

As future work we propose: the development of other models of personality using the Persona-AIML; the creation of chatterbots for environments that involve other entities besides the user (e.g., virtual reality environments); and to verify whether and how the chatterbot can influence the user's behavior.

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