Interaction Manager for Human-Robot Interactions

Student Project Proposal
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Place: Idiap Research Institute, Martigny (part-time work at EPFL possible)
Keywords: Human-robot interaction, Social robot, Interaction design, Dialogue management

Project Description

As robots leave factories to enter human spaces, they will need to be provided with multi modal behavior that are suited to different types of interactions. When communicating between each other, people use a number of verbal (words) and non-verbal cues (such as prosody, gestures, and gaze). In an interaction both people create verbal and non-verbal cues and react to the cues of their partner. Similarly, to interact with people, robots need both to perceive and produce congruent verbal and non-verbal behaviors.

There has been significant work looking into dialogue managements for chatbots and multimodal communication for social robots, i.e. communication using speech but also gaze, proxemics (physical distance better locutors) and gestures. This project aims to integrate these advances into a robotic system and provide an easy way to create human-robot dialogues. For example, a robot introducing itself when someone looks at it, telling a joke if the person asks for one, and then using the person's laughter to learn whether the joke was a good one.

In this project (semester or master), you will use RASA[1], a commercial dialogue management system used in many chatbots on the web to handle turn-taking discussions. You will interface this system with a simulated robot as well as a real Pepper robot to create scenarios allowing people to interact with Pepper in different ways and ensuring that Pepper's responses are appropriate both verbally and non-verbally. For this, you will need to use Pepper's sensors to make sense of the world and understand people's speech, relay this information to the dialogue manager in RASA, and treat the outputs of the dialogue manager to create real robot behaviors (speech and gestures).

Figure 2: Example of interaction.

Main tasks and goals

The exact project goals will vary depending of whether the project is a semester project or a master project.

1. Complete the tutorial at `http://wiki.ros.org/hri/Tutorials/ROS4HRI-walk-through`.

2. Connect the dialogue manager in RASA with a Pepper robot.

3. Implement multiple interaction scenarios using the Pepper robot.

4. Integrate the system with a UI such as `https://github.com/paschmann/rasa-ui`.

5. Evaluate the generated scenarios with different people at Idiap.

Practical Information

Prerequisites: Good command of Python, basics of Linux, experience of ROS would be a plus.

Tools you'll use: RASA, ROS, NaoQi, Pepper.

Dates: Available immediately.

Contacts: If you are interested or you have any questions, please contact **Emmanuel Senft** (esenft@idiap.ch).