Master's Thesis Proposals

Speech-enabled learning of Behavior Trees from human demonstrations

Scope

Research topics:

Learning Behavior Trees (BT) from demonstration (LfD) [1] using verbal interaction with human users (HRI).

Goal(s):

1. Extension of the LfD framework with an existing verbal-HRI module.
2. Investigate the possibility of improving the existing speech recognition framework.
3. Validation of the extended framework with thorough experiments.

Approach

The work will address the following points:

- Integrate and extend the verbal HRI module in the learning framework.
- Adapt and improve the speech recognition module.
- Deploy the system on robot in real environments and test the verbal interaction in diverse tasks.

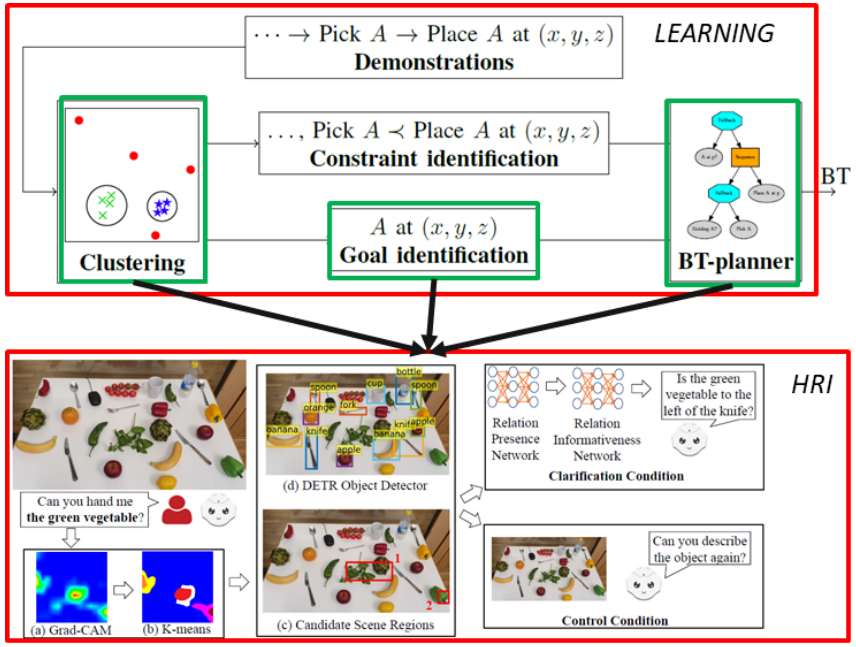
Description

Behavior Trees are a reactive task switching policy representation, used to control robotic agents. LfD can be used to teach the robot a task and BTs can be generated out of human demonstrations. However, ambiguities might rise if the target object for the task is similar to other objects in the environment. Thus, verbal-HRI can be used to disambiguate the task, both during the learning step and the execution step. The objective of the project is then to build a framework for continuous interaction between human and robot, from learning a task to execute it.

Required background

- System integration with ROS (ROS2 is a plus)
- Software: Python3.
- Familiarity with machine learning methods.
- Experience with computer vision and dialogue systems is a plus.

[1] https://arxiv.org/abs/2109.07133



Timeline

- Start: between Jan. 2022 and June 2022
- Duration: 6 months
- Place: ABB CRC (Västerås)
- ABB will cover the accommodation in Västerås

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