

# Communication framework by utterance interpretation on cooperative robot tasks

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## Abstract

It is difficult to obtain the mutual understanding between the human being who speak a different language. Even if we talk in a common language, it is not always easy to establish their communication. Because of we need to match the interpretation of their each word.

In this paper, we propose a framework for communication between autonomous robots using utterance information. This framework provides the way to decide meaning and effect of the utterances by the reinforcement learning through the interaction between the robots on an environment. Each autonomous robot makes three pieces of information on environment. One is the internal information, next one is the utterance information, and last one is the actions of the robot itself. The internal state is robot's situation on environment. The utterance information is any message to pass to the other robot and self. The action system select the robot's action on the situation. A robot has original systems. They are the interpretation system, the utterance system, the action system. The robot's interpretation system build how to interpret through its word and guess another internal information from another utterance. The utterance system makes utterances. The action system tries to make the optimal action for the robot. There are two learning systems. They are the robot's interpretation system which build how to interpret through its word and the robot's action system which obtain the optimal action.

We set it up that the robots solve the imitation tasks in a closed space. The imitation tasks are to guess the position and angle of the other robot, the robot avoids obstacles and others, move without colliding all things.

In our result, the robots have behaved as decreasing in distance between the robots. Also, the robots have obtained one for a word. We have shown the relation of the interpretation systems through the observation of each autonomous robot.