SUMMARY OF Ph.D. DISSERTATION

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Title

Spontaneous Behavior Selection for Entertainment Robots

Abstract

In this study, I focus on the robots for entertainment, and propose novel models generating various behavior patterns and for robots to select their own behaviors spontaneously.

One important problem for entertainment robots is variation of behaviors. If robots behave always same, the humans get bored with the interactions. But, too frequent changes also prevent interactions. So, the behaviors of robots are desired to be static locally but be able to change globally. And also, the period to keep one behavior should not be fixed but be various for the rich behaviors.

In this study, the target of a behavior is called behavior parameter. By making the behavior parameter various, I achieve various behavior patterns.

At first, I assume an environment in which there are many robots or humans interacting, and propose Observation-Oriented Model for such environment. With this model, robots observe the behaviors of other robots or humans, and tend to select similar behaviors. As the result, robot groups generate a same behavior parameter and they behave stably. But, errors on observation are purposely occurred. By the errors non-similar behaviors are rarely selected. These rare behaviors may diffuse by the mutual observation, and finally the global change of behavior parameter can occur.

Observation-Oriented Model has no assumption on the structure of behavior parameters. So, I next assume that the target objects of behaviors have features such like color or size. With this assumption, I propose a novel model, named Feature-Drift Model, which can generate various behavior patterns without other robots. With this model, a robot emphasizes some features only and ignores other features, then pays attention to an object stably. But, the emphasized features are changed passing time. As the result, the target object can be changed through a feature, which means global change can occur.

I run these models in simulation environment and investigate the characteristics of them. Especially with the frequency of the period to keep one behavior parameter, they can generate very long periods and very short periods, which suggests both models can generate locally stable but globally changeable behavior patterns. And also, this frequency distribution suggests both models are different from simple random selection model and can generate very complex behavior patterns. I implement one model on a real robot, and confirmed my models can perform on real environment.