Sample of Level 3 English Editing

Field of research: Robotics and mathematics

1. INTRODUCTION

A robot usually needs to performtake several behaviors performed in a sequence for achievingto accomplish a task, since accomplishing a task usually requires behaviors performed in a row [1]. An. Therefore, an intelligent robot must therefore be able to select a dependable behavior from a set, to deal with a given task inamong the behaviors under a current situation and a given task. Here, the we define a dependable behavior is referred as a situation-adequate as well as a goal-oriented behavior [2].

To select a dependable behavior for achieving a task, thea robot design of the robot must take into account for the following properties must be designed to include following pr:operties [3]. tThe robot must be able to

Figure 1: Causation between stimulus, internal states, and behaviors, and transitions between internal states to select a behavior based on motivation.

generate relationships between situations (or stimuliius) and behaviors for selecting a situation-adequate behavior; additionally, Also, the robot must be able to generate behavioral sequences with respect to goal-orientedness for achieving a task [3]. The dD It is not easy to designing the of behavioral sequences is nont- trivial, since the samea task can be accomplishedhieved by various behavioral sequences, but not by a fixed behavioral sequence according toas per the current situations [4].

Let us consider a simple task in which a robot brings an object to a human being. The robot usually achieves accomplishes the task according toby the followinga behavioral sequence: as follows. (1) the robot searches for the object;, (2) after achieving (1), the robot approaches the object;, (3) after achieving (2), the robot picks up the object;, (4) after achieving (3), the robot searches for the human being;, (5) after achieving (4), the robot brings the object to the human being. THowever, there are several a lot of behavioral sequences in even in thise simple task. For instance, the robot can miss thea position of the object (or the human being) orand drop the object whenever it executes executes individual behaviorsbehaviors in the process of the task in performing the task. In addition,Also, the human being can change his or /her own position whenever the robot executes the individual stepsbehaviors in the process of the task. The robot must execute perform dependable behaviors in various sequences for resolving given situations and to accomplishhieving the task. T and there are an uncountable number of behavioral sequences in the real world.

Nevertheless, the all behavioral sequences contain a common structural property in that- tThe behavioral sequences must necessarily satisfy preconditions before executing a behavior is executed. In the abovementioned taskexample mentioned earlier, the robot can execute the following behaviors after satisfying the preconditions in order from (1) to (5). In accomplishing a task, hHuman beings extract a common structural property from certain behavioral sequencesfor achieving a task from some behavioral

~~sequences~~. According to given situations, t~~T~~hey generate new behavioral sequences based on thi~~se~~s structural property ~~according to given situations~~. They also select a dependable behavior based on these ~~the~~ new behavioral sequences. The structural property can be useful for generating various behavioral sequences without having to ~~designing~~ generate all possible behavioral sequences.

A robot must be able to ~~implicitly or explicitly~~ generate behavioral sequences implicitly or explicitly according to given situations. A motivation can be used for selecting behaviors ~~according to current situations~~as per the current situation. Here, the motivation is a property that activates or energizes a behavior. The motivation can be used to ~~represent an internal state of the robot and~~ recommend~~ed~~ a behavior to the robot ~~on the basis of~~based on its current internal state [5, 6]. Fig. 1 shows causation between stimuli~~us~~, internal states, and behaviors, and the transitions of internal states based on motivation. In~~The in~~ternal states cannot be directly observed, but~~and it~~ can be inferred by a selected behavior. A~~The~~ motivation-based behavior selection method implicitly generates fully -connected transitions of internal states by perceiving a current stimulus. Thus, thi~~se~~s method can generate various behavioral sequences according to given situations. This ~~method~~ is useful in ~~the~~ case ~~that where~~the modeling of all state transitions is difficult, since it can generate state transitions without state transition models. This method ~~Especially, it~~ is ~~an~~ especially appropriate in ~~method to~~ executing~~e~~ behaviors under various situations that ~~frequently~~ are often~~are~~ generated

Figure 2: Results of qualitative comparison of related works.

by interactions between a robot and human beings ~~and a robot~~, like entertainment or service robots, since state transitions ~~can be frequently varied~~can frequently vary ~~by~~because of human intentions [7]. However, in the motivation-based behavior selection method it is ~~not easy~~difficult to select a goal-oriented behavior by implicit transitions of internal states as shown in Fig. 1. To select a dependable behavior, the motivation must be generated with respect to the goal-orientedness of a given task.

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