Joint Activity Testbed: Blocks World for Teams (BW4T)

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Abstract. This demonstration will be the presentation of a new testbed for joint activity. The domain for this demonstration will be similar to the classic AI planning problem of Blocks World (BW) extended into what we are calling Blocks World for Teams (BW4T). By teams, we mean at least two, but usually more members. Additionally, we do not restrict the membership to artificial agents, but include and in fact expect human team members. Study of joint activity of heterogeneous teams is the main function of the BW4T testbed.

Keywords: Joint Activity, Coordination, Teamwork.

1 Introduction

This demonstration will be the presentation of a new testbed for joint activity. The domain for this demonstration will be similar to the classic AI planning problem of Blocks World (BW) shown in Figure 1. BW has been a popular test domain with the Planning community because of its simplicity and was borrowed by the Distributed AI (DAI) and Multi-Agent Systems (MAS) community to study distributed planning and coordination. We extend BW into what we are calling Blocks World for Teams (BW4T). Teams consist of at least two, but usually more members. Additionally, we do not restrict the membership to artificial agents, but include and in fact expect human members. Study of *joint activity of heterogeneous teams* is the main function of the BW4T testbed.

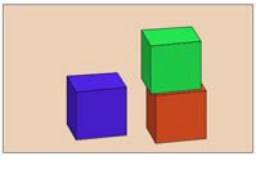

Fig. 1. Basic Blocks World

H. Aldewereld, V. Dignum, and G. Picard (Eds.): ESAW 2009, LNAI 5881, pp. 254–256, 2009.

2 Blocks World for Teams (BW4T)

In order to study joint activity of heterogeneous teams in a controlled manner, we extend the basic BW problem in a few ways. First, instead of having only one player, as usual in BW, for BW4T we allow multiple players as in the DAI and MAS work. Our approach is different in that players can be combinations of both human and artificial agents. Second, instead of having all the blocks visible on a table, we hide them in a series of rooms. Agents can only see blocks that are in the same room as they are. This feature is added to force the coordination to be explicit, i.e., to force coordination through communication. Coordination can frequently occur through observation of the environment and non-verbal cues. While implicit coordination is another valuable area of study, these cues can be very difficult to detect and measure. Restricting the visibility will force explicit communication. A restricted chat window is provided for communication. By controlling the goal and the communication options, we can influence the need for coordination and type of coordination available during the joint activity.

2.1 The Environment

Figure 2 shows the basic setup: a number of colored boxes are hidden in a number of rooms that have one or more doors. In Figure 2, we show twelve rooms arranged in three rows of four, containing a number of red, white and blue boxes.

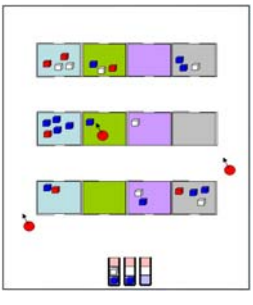

Fig. 2. BW4T basic setup with everything visible

2.2 The Players

Each player in BW4T controls an avatar in the environment. The players must navigate their avatar around the world and perform simple pick-up and drop-off actions. Human team members use a simple keyboard and mouse interface. Players communicate through a restricted chat like interface. The messages are restricted to a domain relevant set to bound the interpretation problem for artificial agents and still allow for a very diverse set of coordination techniques by the players. Players have their own interface and are restricted as to what they can see. As an example, consider a two player BW4T example shown in Figure 3. Players, depicted by their red circle avatars, can only see the contents of the room they are currently in and do not see the other players or their status except through communication.

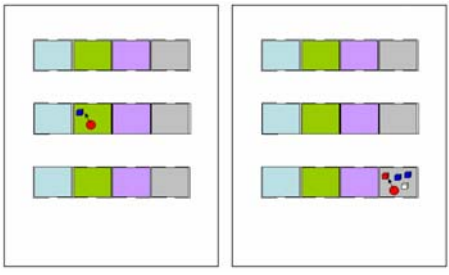

Fig. 3. BW4T - 2 player example

2.3 The Game

At the bottom of the interface, as shown in Figure 2, there is a set of bins. The bins depict the color pattern required. The team goal is to fill each bin to match the specified pattern as fast as possible. Players may "carry" only one block at a time. To retrieve a block, each player must maneuver its avatar into the various rooms, to find the block of interest. Then the player must navigate to the block of interest to "pick it up" and maneuver the robot into the goal area to "drop it off" in the appropriate bin.

3 Related Work

While there have been plenty of MAS testbeds, it is rare to find a testbed specifically designed for arbitrary sized heterogeneous (human and agent) teams. This testbed is similar to MICE (Michigan's Intelligent Coordination Experiment) [1] in that it addresses a simple domain. BW4T is similar to Gamebots3D [2] in that we focus on human participation. While its initial domain is a simple one, we expect to add more domains with increased complexity in the future.

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