

Libraries for Communication ReadMe

1 Introduction

In disaster relief settings, it is possible that the control room must command not only subordinates who are usually leading but also workers from other regions (for example, a fire brigade from a neighboring town). For this reason, when considering real-life disaster relief, the command center must be able to lead any agent, and agents must be able to react to commands.

To solve this problem, we designed the communication library. By using the library, it becomes easy to separate the development of the command center and development of the agent. In other words, we can easily separate strategy and tactics. “ Strategy ” here means the overall policy in the virtual disaster space, and “ Tactics ” means details for executing the strategy (for example, which fire should be extinguished).

2 Concept

This library separate “ Strategy ” and “ Tactics ”.

Here, Agents have a duty to take action according to the “ Task Message ” sent from Center. In addition, Agents send the surrounding information that are obtainable (e.g. building, blockade, civilian, and so on) to other rescuers (Agents and Centers).

Centers have a duty to analyze the current situation from received information, and send “ Task Message ” to Agents by result of analysis. Moreover, the Centers integrate the information coming from each Agent, and send back the integrated information to the Agents.

Agent	Take action according to the task.
	Send the surrounding information to other rescuers Gather information from other rescuers as knowledge
Center	Send the task to Agents
	Integrate the received information Send back the integrated information to Agents

Table 1: Concept of Library

3 Usage

Main steps to use this library are only two steps.

1. add this library to build-path
2. Extends AbstractCSAgent when you create each Agent or Center.

Here, we should override two methods in the extends class.

- protected EnumSet<StandardEntityURN> getRequestedEntityURNEnum()
This method need to be created as well as the class that is not extending AbstractC-
SAgent.
- protected void thinking(int time,ChangeSet changed,Collection<Commnad> heard)
This method is a replcement of think(...) method.

3.1 thinking(...) method

The thinking(...) method is a part that each user have to build, and decide agent's action.

In this method, we should set the channel that agents use to communication with following method(1).

setMessageChannel(int channel) (1)

Additionally, When agents add transmission message, you should use following(2).

addMessage(RCRSCSMessage message) (2)

The messages that added by addMessage(message) method are sent automatically at the end of each step. And the messages that received at the step are converted at the start of the step, and are available as receivedMessageList¹.

4 Message

There are three types of sendable messages.(Information Message, Task Message, Report Message)

4.1 Information Message

The Information Message shows information obtained from the disaster space. It doesn't include static information (outline of roads, gross area of building, etc.) to reduce the size of data.

Table 2 shows the types of Information Message and the elements included in it. Here, the items with an asterisk(*) in **Table 2** are optional items. The developer can include the item or not.

4.2 Task Message

The Task Message gives the order (e.g. help civilians in area). However, this Message does not order agent behavior directly. This type of message provides only the direction of the behavior. The type of Task Message and the included elements are shown in **Table 3**.

4.3 Report Message

The Report Message reports the results of each strategy. The types of Report Message and the included elements are shown in **Table 4**.

¹It is depends on each Agents and Centers to judge who the message was sent to.

Information Message	Elements contained
Building Message	fieryness,brokenness
Blockage Message	road ID,barycentric coordinate [*] ,repair cost
Victim Message	area ID,HP,buriedness,damage, position coordinate [*]
Position Message	agent ID,position coordinate
Transfer Message	agent ID,IDs of some area
Unpassable Message	agent ID,fromAreaID,toAreaID
FireBrigade Message	agent ID,HP,buriedness,damage,water quantity, area ID
PoliceForce Message	agent ID,HP,buriedness,damage,area ID
AmbulanceTeam Message	agent ID,HP,buriedness,damage,area ID

Table 2: Definition of Information Message

Task Message	Elements contained
Clear Route Message	pf ID,ID of work beginning area,ID of end of work area
Rescue Area Message	at ID,rescue work area ID list
Extinguish Area Message	fb ID,extinguish work area ID list

Table 3: Definition of Task Message

Report	Elements contained
Done Message	agent ID
Exception Message	agent ID

Table 4: Definition of Report Message