Creeps Rescue Team

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Abstraction

This paper is presented to explain some of the work we have done on rescue simulation. Here shall our thoughts and decisions be presented as the space allows. We have used neural networks and machine learning algorithms to define our program and control our units.

Introduction

RoboCupRescue problem is defined as to simulate an urban disaster. There are agents that are used to rescue the civilians and the city. These agents are ambulance teams, police forces, fire brigades and the centers. These agents are able to act on the disaster area in the simulation system.

As there are houses and buildings damaged by the disaster, they might burn and then collapse. Each fire can spread to the near buildings. One of the goals is to stop the fires from spreading and destroying the buildings.

There are some civilians injured in the disaster and they must be saved or they might die or get caught in fire. Also most roads are blocked and need sweeping so that our agents could move in them.

To overcome these obstacles we have revised a solution. The basis of this solution is on the simple neural network algorithm, with some help from machine learning (ML) algorithm.

The best way for saving the remains of the city was for all agents to work separately from each other and yet communicate with each other in crucial moments. In other words while working completely separate, yet they have to work as a team and they have to be assigned and classified to positions.

To gain the goals mentioned, we used neural network algorithm as the base of each agent so that it would work as a single unit but completely functional in a team. Also to gain a full companionship, yet not more than needed we use the ML algorithm.

Agents and the environment

Each agent has an area of view which it can gather information from it. In our design each agent gathers the information and analyzes them, by observing a crucial information, if this information is not related to his job, the agent send the information to

his center where in turn his center will send it to the related center which needs to know this info.

After a piece of info has arrived from another center, the center will call his nearest and not busiest agent. This agent will take over the role of considering this data.

If an agent is not encountered by any crucial data, then it always continues his actions by his previous decision. This way an agent is always busy trying to do his job while there is not a new crucial info for it.

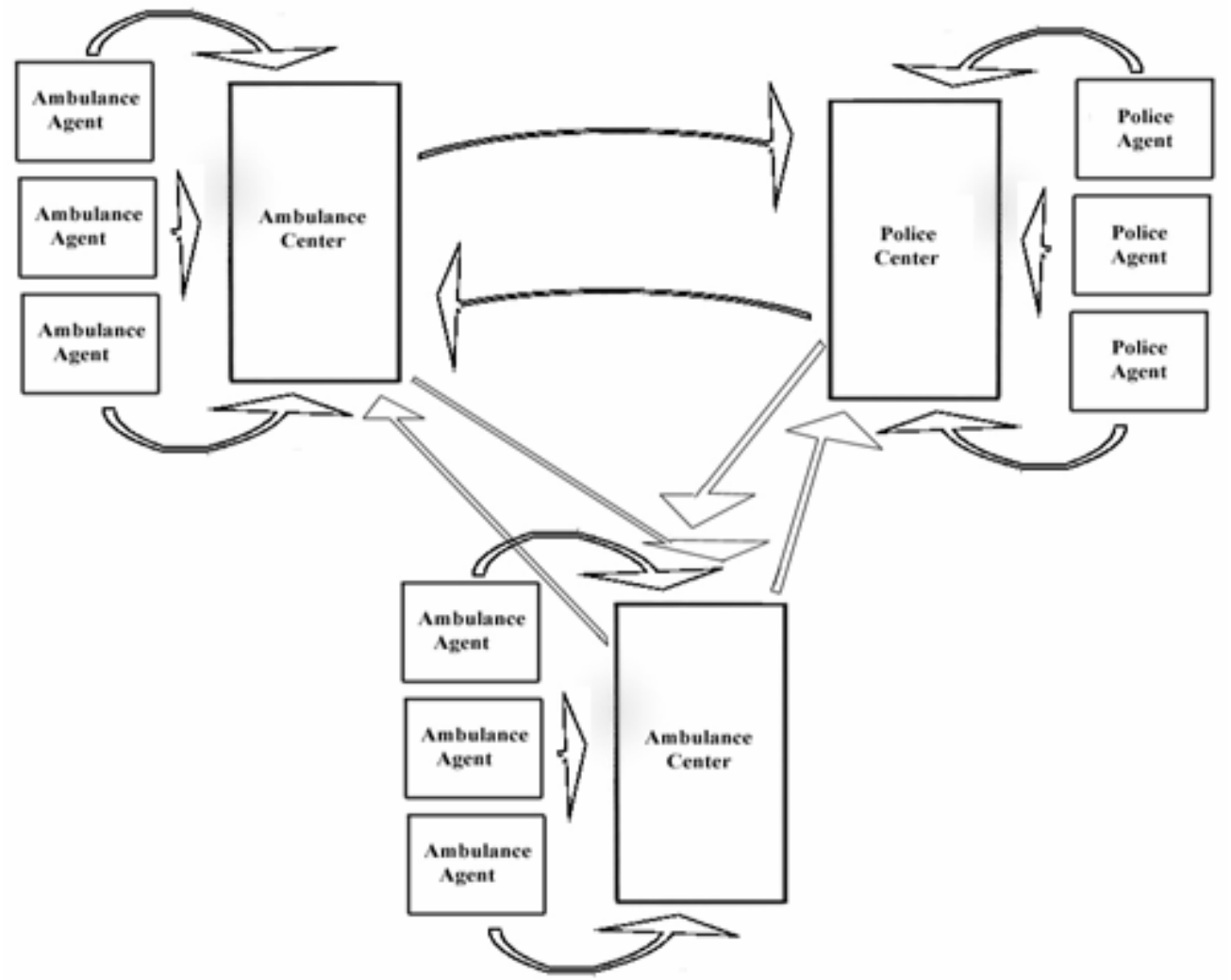
Centers of communications

Centers are to communicate between each other and to organize their agents. Each center will always know the exact location and the amount and the priority of the job of his agents, so this way a center can always decide the actions with a new info.

Centers handle the leadership of the agents in the city and organize their actions in order to gain a better performance. Although centers decide the agent who must handle a piece of info, yet the critical decision is made by the agent himself.

The strategy

The whole strategy of our team is based on better performance on the field. On this account the base of our strategy is to minimize the communications to a level where only the most important information would be transferred to others or nothing. By this basis agents won't have to spend valuable cycles communicating with each other when they have nothing important. You can see our original plan in the following figure:



This is the basis communication plan in our program. In tables below you can see examples of critical info sent about civilians:

Id	Hp	Damage	Position	Buriedness	No. Victimas
2384	9200	17	23	25	1
2388	7900	21	98	60	1
2379	6000	20	1129	35	1
2338	9000	11	2098	15	2
2356	8500	16	2098	30	2
2367	7570	22	1980	16	1

Except all those info, each agent sends some info to his own center in order to check in and so that the center would know the location and status of each agent, so he could decide when to call whom based on the crucial info he receives.

Here is an example of the info sent by some agents to their center:

Id	Availability	hp	Damage	Position	Buriedness	goal
2399	busy	10000	0	706	0	2345
2400	free	10000	0	901	0	
2401	busy	10000	0	690	0	2397
2402	free	9000	2	1850	0	
2403	busy	10000	0	76	0	2367

Conclusion

The basic fact in this simulation is that we need to perform as many usefull acts as we can, and to do that we need to divide our time to the actions.

Our future plan is to optimize these communications even more. Also we need to obtain better decision making units for our agents and centers. So we could take the best decision in every moment.