Research regarding the collective strategy change in the multi-agent system

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In case multiple agents try to achieve a common purpose under dynamic environment, the goal needs to be achieved, being consistent with local activity of each agent.

As one key to solution under such situation, there is the method that plural strategy is given to the agent and the agent selects the strategy that should choose in accordance with the change of environment. When certain agent preceives critical state condition where exerts disadvantage to an individual agent or the whole group, this agent starts the transmission of the information regarding this critical state condition to other agents. The agent who received information must decide whether or not he should change strategy. If he thought heself or the whole group receive disadvantage by this critical state condtion, this critical state condition is avoided by changeing strategy.

There are two method that communicate the information that becomes the judgement material of this strategy change. One is the method that transmission to all the agents with the communication of a large area, another is the method that is going to spread information by dispersing information with a local communication. Although the method of former has the advantage that all the agents thatcompose the system can receive the information that was transmitted from one information resource equally, and have the bad point that delay occurs by the increase of the number of job by information allocation and by the long distance communication. Especially, in the case that the change of environment is sharp and be urgent to judgment, this nature becomes a fatal problem. Conversely as for the method of latter, the delay of information transmission does not occur, but the phenomenon that the information that agent can use to the strategy change differ by the position on field occur.

Thereupon, I do proposal about the method that bad point of the local area communication system is supplemented with this research. Specifically, I do the research of

method that there is not the difference of information when the information become necessary actually by sprending the information that has the possibility that agent can use to a future strategy change previously.

There is situation that the number of the entrance of the sharing supply base on the field is sufficient less than the number of agents. Purpose of the multi-agent system is able to do the supply of energy effectively and possibility many agent survive it is case. This problem is called "energy supply problem".

There is no problem if form line and do turn waiting when the agents receive supply. However, in the case that agents only simple action is possible, conflict occurs among agents after received supply and agents of the before receives supply. Agent who received supply want to part from the supply base, but this agent is not able to move because agents who want to supply surroundings. And agent who want to received supply is not received supply because agent who finished supply is obstructive. Such a conflict is called "Blind Hunger Dilemma".

In the case that agents fell into such condition, system that avoids the situation as effective as possible voluntarily as group. In a conventional method, problem was solved by the agent inside the congestion who perceived this critical state condition doing the communication that asks to draws back to the agent of the outside. (This agent inside the congestion is called "instigator", from that is instigating syrategy change) However, this model is the one that hypothesized the condition where the supply base exist only in one place clearly and all the agents gather there. Therefore this model acts only with the situation that the demerit of the local area communication system is difficult to turn up and considered to lacking in compatibility.

Thereupon, I produced the situation that estabilished the supply base in plural place and agents disperses. In this situation, condition where the difference appears to the congestion of each supply base often turns up. Therefor in addition to use the instigator, with the method that spreading the information of the supply base that is becoming vacant it is conceivable the congestion of each supply base turn even is effection.

And doing the experiment that the proposal model is effective in goal achievement actually could be shown. However, the subject that the communication cost becomes big has remained because this model be in order that it does the communication frequently.