Multi Agent Systems - Assignment 2 - Week 4

Team 47

March 4, 2018

In our base model we implemented a messaging system which is self managed by each agent and which allows to keep control over the network's overall costs by limiting the number of messages sent at any given point of time. We believe that to further enhance this system a coordination paradigm can be implemented to avoid unnecessary repetitions of actions performed by the agents to fulfill their roles.

We explained earlier that each bus is able to query a special unit that can help managing capacity on the line he is working on and that he will be able to exchange messages upon strict rules tied to its own capacity.

In addition to this, we are now experimenting with setting some hard limitations to the actual number of messages that each agent is allowed to send out to the so called "Turtle X". This is because if a congestion happens in one specific part of the map, than it might be tempting for a single unit to keep asking for help in managing the load on its line, creating inefficiencies.

What we want to achieve instead is actually that more than one bus will be able to recognize the problem and therefore act toward finding a solution in that node without using too many (overlapping) resources. If buses cooperate when they think they should ask for help, then we achieve our costs saving goal without having them making irreversible choices and, even more importantly, without having a single node served by unnecessary amounts of buses per given time interval.

More specifically, each bus will be able to call for reinforcement only once at a time and the model is therefore forced to deal with the minimum amount possible of turtles to solve the capacity problem. At the moment we believe that fixing this hard limit to one message yields the best results, but it is a variable we have control of and which opens to experimentation to see if there are potentially more benefits in allowing more messages per each consecutive tick.

After a bus has sent a message, the system is forced to cycle through and re-evaluate the current level of capacity. In this time frame, other buses can interact be either sending a further message or not depending on the overall needs on the line. As we force progression we assume that a congestion will be managed in few cycles without overspending.

This will also preserve us from the laying off of any buses which would results in a bigger amount of messages sent (the costs of sending messages to achieve this goal by far exceed the savings from having less buses in operation).