Slime mold inspired protocol for MANET
User's manual

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Introduction

This manual is related to slime mold inspired protocol designed during an internship at the LIP6, in the multi-agent team with Cedric Herpson. It explains the way to use it to perform an experiment. The code is available on this repository : `https://github.com/AntoninARBERET/Blob`.

Instance

Instances are defined by specific files placed in /blob/src/test/java/resources.

Agent file

Agent files, such as blob-10agents, are used to define the number of agents. It should be removed in a future version.
The mapname is not useful, other lines (one per agent) should be just like this one :
blobAgent:Blob1:0:free:200:0:0

Topology file

Topology files such as mapblob-topology2 define the position of elements at the beginning of the simulation. Both first lines are used by GraphStream. The other ones are written as following :
an 1 xyz=10,12,0 type=blobi //This line is placing an agent node at the x,y,z coordinates (z must be 0).
an f1 xyz=58,36,0 type=food quantity=100000 //This line is placing a food node at the x,y,z coordinates (z must be 0). Used if the mode is FOOD_IN_ENV.

0.1 Food file

Food files such as mapblob-food1 are used if the mode is static to define the food quantity or need of each agent. The mapname is not useful. The other lines are : food:agentID:food_quantity

Parameters

The parameters of the algorithm can be modified in the configuration file located at /blob/src/main/java/eu/su/mas/dedale/princ/ConfigurationFile.java. This section explains their purposes.

Modes

The MODE parameter defines in which mode the simulation is. It has 3 values :

- RANDOM : Each agent has a random chance to find food at each cycle.

- STATIC_FOOD : The same agents have access to food at each cycle of execution.

- FOOD_IN_ENV : The food is located in the environment, an agent on a food spot gets access to it.

Global parameters

The global parameters are related to the whole process of the agent.

- NB_BLOB_AG : Number of agent at the beginning of the simulation.

- AD_TIMER : Duration of the ad package sending phase at the beginning of the simulation.

- COMM_REACH : Communication reach, same for every agent.

- DELTA_T : Time interval between two states package sending.

- ROUNDS : Number of rounds in one cycle of processing in BlobingBehaviour.

- STEPS : Number of steps in one round of processing.

- PROBA_SINK : Probability for an agent to be a sink and to need some food during one cycle (not used in the presented model but can be useful again on a future version).

- PROBA_SOURCE : Probability for an agent to be a source and to get access to food during one cycle (not used in every mode).

- DELTA_PRESSURE : Difference of food between a normal agent and a sink or a source.

Mathemathical model and decision parmeters

- D_MAX : Maximum diameter of a connection.

- R : Linear decay rate of the tube size.

- MU : Impacts the network building which is going to build robust multiple paths if mu is between 0 and 1 or efficient single paths if it is bigger than 1.

- A : Has a little impact on route selection.

- FOOD_BOUND : Quantity of food that every agent tries to reach.

- PICK_CAPACITY : Maximum food an agent can pick during a cycle.

- FOOD_CONSO : Food consumed by an agent during each cycle.

- PROP_KEEP : Minimal proportion of the food an agent will keep for itself during each cycle.

Exploration

- EXPLORATION_ENABLED : If true an agent will explore the environment creating new nodes with new agents on it if it and its neighbours are fed enough.

- TEMPO_EXPLO : Minimum duration between two explorations of an agent.

- PROBA_EXPLO : Probability to explore if fed enough.

- NB_DIRECTION : Number of direction the agent can choose for exploration. Angle are $2\pi \frac{n}{NB\_DIRECTION}$ with $n \in [0, 2\pi[$.

- DIST_MIN : Minimum distance between the explorer node and the new one.

- DIST_MAX : Maximum distance between the explorer node and the new one. Should be lower than COMM_REACH.

- PROBA_DEVIATION : Probability for a new node not to be placed in the normal direction, which is the one less explored. Used in order to avoid having an unidirectional exploration.

- MY_PROP_FOOD : Proportion of FOOD_BOUND an agent needs to consider itself fed enough to explore.

- NEIGHBOURS_PROP_FOOD : Proportion of FOOD_BOUND an agent needs to be considered fed enough by its neighbours to explore.

GUI

The GUI allows the user to move a node in the space on the x and y axis in order to manually change the topology of the network. The connections can be modified between the agents. A feedback of the connections states is displayed on the edges. The green square is a bilateral connection (agents have detected each other), the red one is an unilateral connection (only one agent has detected the other) and the black cross is a dead connection between two agents not in communication reach anymore.

Figure 1: Connections feed back