

# **Scientific Data Processing in MATLAB**

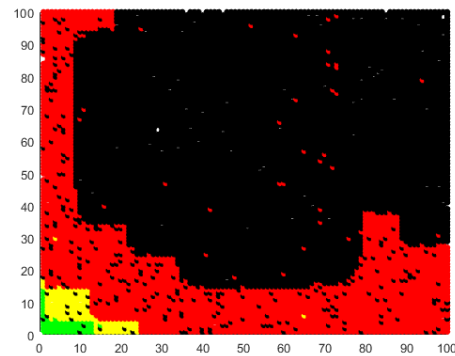
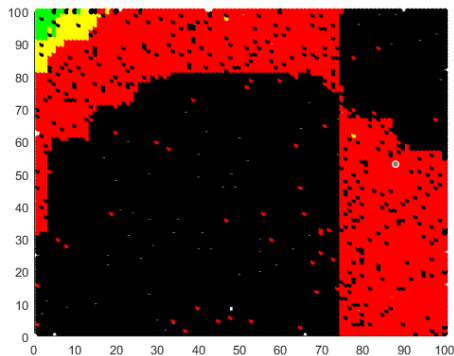
## **Programming Assignment 6**

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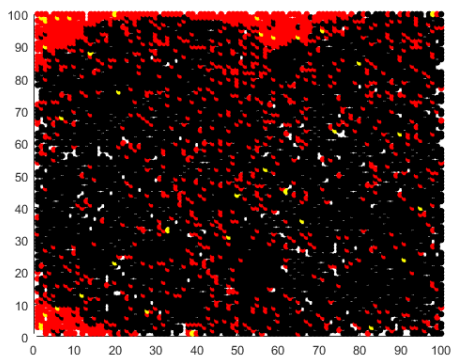
11/01/2019

# Task 0:

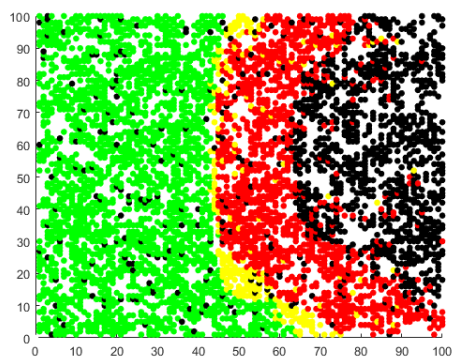
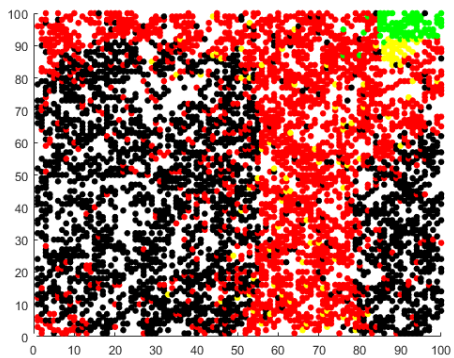
Screenshots of the provided Observation Agent:



Change 1: INITIAL\_TREE\_PCT = 0.2



Change 2: INITIAL\_TREE\_PCT = 0.2, NUM\_INFESTED = 2, SEEDLING\_DISTANCE = 2



## Interpretation:

Before changing, the map is filled with trees (more than 9000) when finished simulation, and most trees are dead.

By decreasing the initial tree percentage, the result seems change little (the number of trees is about 200 less than before), because the trees are seedling at each time step.

When decreasing NUM\_INFESTED and SEEDLING\_DISTANCE additionally, the result significantly changed. The number of trees as well as dead trees are much less. With a smaller number of initial infested trees, the final infected trees became less. And with a small seedling distance, the final number of trees became less (about 6000).

# Task 1:

**RockAgent:** An agent representing a rock, who has no behavior but occupies a spot. A group of rocks may block off parts of the forest and stops propagation of both seedling and beetles.

**MeteorAgent:** A global agent who can randomly generate meteor events at each time step. For each meteor event, a random spot will be chosen, nearby trees will be destroyed, and several RockAgents will be left there. The radius of destroyed trees will be larger than that of rocks.

## Changes:

Constants.m - Add two constants

Location.m – Change the calculation of *distanceTo()* to Euclidean Distance;

    Add a new function *distanceToLine()* to calculate the distance to a line, which is denoted by two locations.

Simulation.m – Add a new function *deleteAgent()* to remove all kinds of agents;

    Add a new function *getNearbyEmptySpotsOfLine()* to get the set of empty locations within the rectangle denoted by the passed-in locations.

SimulationDriver.m – Add some random initialized RockAgents;

    Add a MeteorAgent to globalAgents.

ObservationAgent.m – Add a color “Brown” to represent rocks. No other changes.

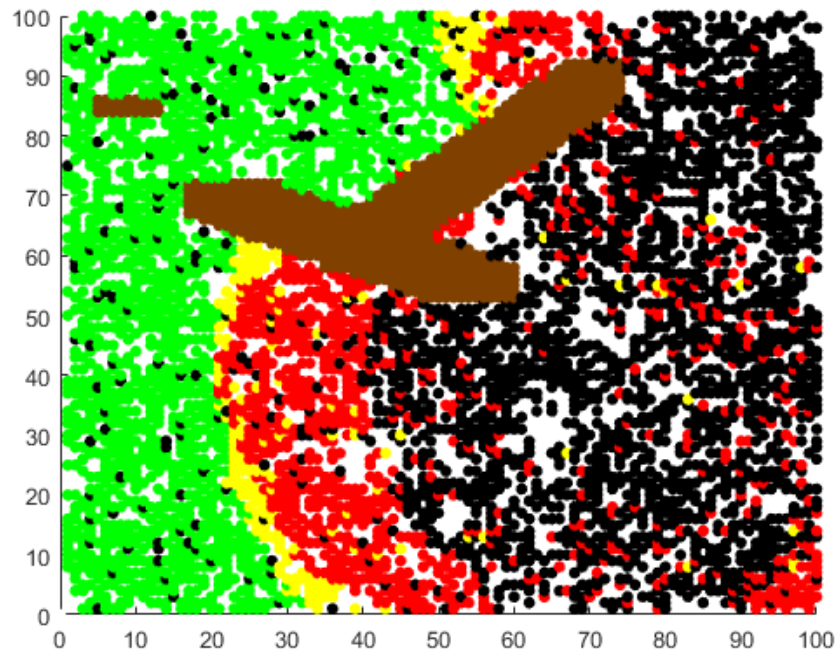
## How to run:

By running runDriver1, you can see the simulation with some random initialized rocks.

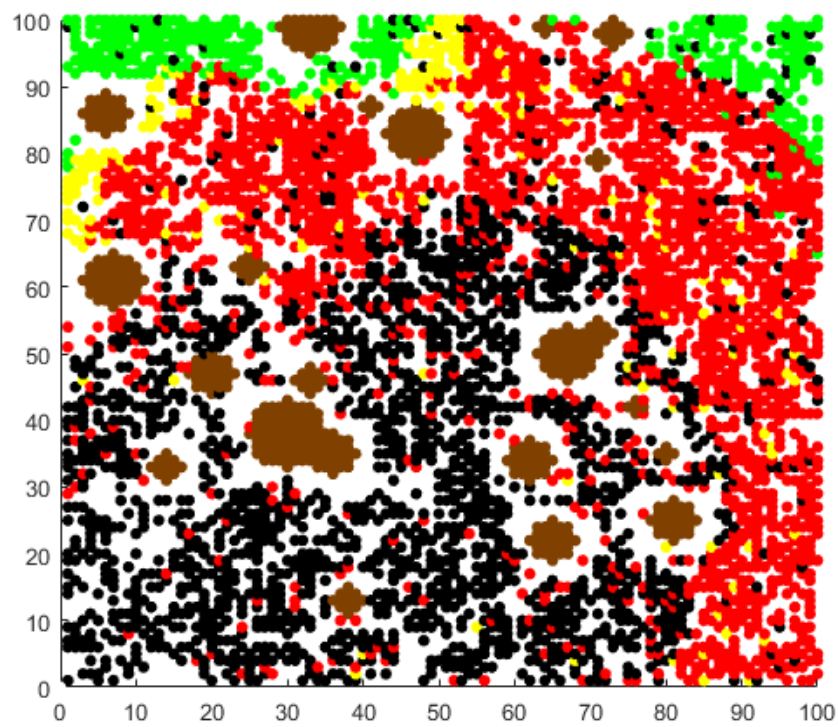
By running runDriver2, you can see the simulation with a MeteorAgent.

## Task 2:

Simulation result of RockAgent:



Simulation result of MeteorAgent:



## Task 3:

A new Observation Agent is implemented (ObservationAgent2). By running runDriver, you can see the simulation with both random initialized rocks, a MeteorAgent, and the ObservationAgent2.

The Axis-Z represents the age of the trees, the older the higher. Rocks will always be the lowest ones.

The color scheme is richer. Green denotes healthy pines, and older trees will have a daker green shade. The infested pines are colored from yellow to red. The redder, the heavier a tree is infested.

