

**Workshop on World Modeling • Workshop on Methods of Human Security Studies**  
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**Lecture Thirteen: Analysis of Simulation Results (July 19th)**

Today's Target:

In a thorough analysis of the results of a simulation, there are cases where the output of the space and the graph are insufficient. In this lecture, I will introduce to you a method to record the whole trial by taking the Log and a method to output and input necessary information in a file.

● The Making and Operation of the Log File.

Open the model. And from the upper menu, select 「Log > Record」. A screen titled Simulation Memo will appear. Here you will name the Log. If you select OK, the trial will start and you can end it with Stop. This Log is kept in the replay Log folder, right under the folder where MAS is kept.

In order to playback the Log, you will need to select 「Log > Replay」 after you start MAS as you usually do. From the Simulation Selection Screen, you can select the Log you want to replay. The Log is read in and the replay will begin. The Log can be replayed, reverse played and in addition to replaying by steps, you can even select the steps you want to replay, using the slide bar. If you select Stop on the Log replay panel, that will terminate the Log mode and you will return to a clean state.

Practice :

Example: Use 10-1 (or a model you've made in the past ) and make a Log file.

● Setting File Output

In order to closely analyze the simulation results, it might be necessary to do statistical processing. You might want to plot the conclusion part of several hundred examples of

trail data using outside software for graphs. In this case, a data file would be useful. Data file output is added by the use of the output setting. You first designate the file name and in this name you would output a directory which would be the same as the model data file. You will be able to designate letters to distinguish each item of data. Ordinarily, if you select a comma from the tab, it will be convenient to read in Excel. If do so, the output is `direction,X,Y`, the data is written in the following format.

```
//05/07/17 12:21:13
Step ,direction,X,Y
0,221,25.0,10.0
1,15,24.0,20.0
2,74,23.0,24.0
3,320,23.0,22.0
4,155,22.0,15.0
```

You will start a new line each step. The value designated at the end of each step is distinguished by a designated separator character (in this case it is a comma).

Example 1 :

Download the sample answer of Assignment 10–1, and output the number of rotten tangerines. And let's read it in Excel.

First of all, make a variable that shows the number of rotten tangerines in the Universe. And then...

```
Univ_Step_End{
dim set as agtset
dim obj as agt
```

```
MakeagtsetSpace(set, universe.TUKUE)      ← list all agents on the table.
```

```
universe.RNum = 0                          ← initialize the variable (count from 0 each time)
```

```
for each obj in set
```

```
    if obj.fuhai == true then                ← if it is rotten and is true...
```

```
        universe.RNum = universe.RNum + 1   ← +1 to variable
```

```
    end if
```

```
next obj
```

```
}
```



```

        my.x = ReadFileCSV(1)      ←read the next 1 data and replace in X.
    next i
    CloseFileCSV(1)              ←close file number 1

```

These values will be Read in your X values in the order of ID. (If ID0 then x is 10 and if 1 it is 14)

In Writing, `WriteFileCSV()` will be used. In the Write mode, just Write by replacing the letters. In the Append mode, add to the end as addition. There are three arguments. The first one is the file number. The second is the content of what you will Write. You can Write Pool (true/false), Integer, Double and String as String. The third Writes in Pool whether it is to have a new line or not. For example;

```

WriteFileCSV(1, my.x, true)
WriteFileCSV(1, my.y, true)

```

Here your X and Y are written, and a new line is required each time. Therefore, you will Write the following in the file;

```

"3.4433333"
"42.321111"

```

③ Lastly we will close the file using `CloseFileCSV()`. The only argument is the data file number.

Example 2 :

Let's use the Input and Output file function and Output the number of rotten tangerines and the number of steps. Of the tangerines, select the rotten ones from the `step_end` of Universe and count them and Output. The number of steps can be obtained by `Getcountstep()`.

```

OpenFileCSV("data.txt", 1, 3)
WriteFileCSV(1, getcountstep(), false)
WriteFileCSV(1, universe.RNum, true)
CloseFileCSV(1)

```

● Setting the Initial Value of Input and Output of File.

The initial values of variables can be read from the files. In the simple method, you will output an empty CSV file from the initial value setting of the item which you want to set. Read it into Excel and set it.

### Example ③

In the Fugitive Model, the fugitive and the chaser wander in the mountains. The higher the mountain, the slower the speed of the chase. Let's download the data on the natural features and the terrain of the mountain and input the height of the mountain. The data on the terrain is in the CSV file. After the input, try to output the height of the mountain.

### ● Assignment

Let's use the Segregation Model. Try to change the satisfaction level running from 0 to 100, of each agent at every 10%. You can use some spread sheet software for tables and prepare a graph showing the condition of average segregation after 100 steps (plotting the average ratio of the same kind in each agent's vicinity.)