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Netlogo simulation: effective for agent based modeling in artificial intelligence

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Abstract: Today practical knowledge is as important as theoretical knowledge. But the cost of setting up practical labs is not easy and needs maintenance on a regular basis. But with the emergence of many simulators, practical knowledge can be imparted through setting up of virtual laboratories with the help of computers. The cost of maintenance also decreases to a large extend.

Our paper focuses on one such simulator named NETLOGO. NETLOGO is immerging simulation software for agent based modeling. It is easily installable in a machine and can be downloaded from the net. It is free software. This paper deals with the usage of NETLOGO from both student and professors perspectives. The paper will state the advantages and disadvantages of the simulator along with a simulation example. Though there are many agent based programming languages yet our paper is trying to show the effectiveness of using NETLOGO as a simulator for agent based modeling.

Keywords: Netlogo simulator, agent based modeling.

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I.   INTRODUCTION

The previous papers describe the various simulation tools that can be used in virtual laboratories. From the past it has been seen that laboratories had been the integral part. Despite of that there are some serious disadvantages mentioned like cost of setting up, cost of maintaining and updating of the new equipment's so use of virtual laboratories in the form of computer simulation emerge as a solution.

Simulation can be performed either by writing a simulation program or by using a readily available simulation software package. A simulation software package can be of two types - general simulation packages and dedicated simulation packages. Our base paper concentrated on one of the general purpose simulation packages, showing its effectiveness in simulating all kinds of engineering problems (report taken from Dogan Ibrahim, 2011).Our paper focuses on proving the effectiveness of NETLOGO simulation in agent based modeling**.**

We performed a survey on the advantages of using simulation software rather than a programming language. We simulated one scenario using operating system concepts by creating agents in the simulator. We are going to prove its efficiency over other programming based agent modeling. Solution Methodology

Our paper is focusing on one of the dedicated simulation packages. Dedicated simulation packages are used to simulate only specific and complex problem areas. We are going to show the effectiveness of using NETLOGO simulation in agent based modeling over agent based programming languages.

Our survey states that programming in agent based modeling requires efforts of programming knowledge and the program is written for a particular simulation problem. Though it's cheap by some extend but its time consuming. It's worth mentioning that all users of agent based modeling may not have sufficient programming skills, in that case the programming language would be of no help to them for modeling agent based systems. But use of NETLOGO simulator can overcome the problem of having good programming skills and it's free so no maintenance cost. It is a quick process to simulate with NETLOGO and get results.

To prove that NETLOGO works effectively in simulating agent based models/systems, we are going to show a simulation example in NETLOGO which will attract users to simulate rather than write codes in programming languages. We are going to show the process state transitions in our paper. A process changes state as it executes. There are five states namely:

1. New state

2. Ready state

3. Running state

4. Blocking state

5. Terminated state

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In the new state the process is created and gets ready to be admitted to the ready queue. Then it moves to the ready state where the process is placed in the ready queue to get assigned to a processor. When a process is assigned a processor, it is in the running state that is it is getting executed. If the process is in need of some resources, it moves to the blocking state and waits there. When the resources are made available, it returns to the ready state and waits in the ready queue to get assigned to a processor. If a running process gets an interrupt signal, it stops its current execution and moves to the ready state again. When the interrupt gets handled, the process is again brought back to the running state. When the process completes its execution, it moves to the terminated state. This is the total transition of a process from new to terminated state (Section taken from Silberschatz et al).

Screenshots of the working example in NETLOGO simulator
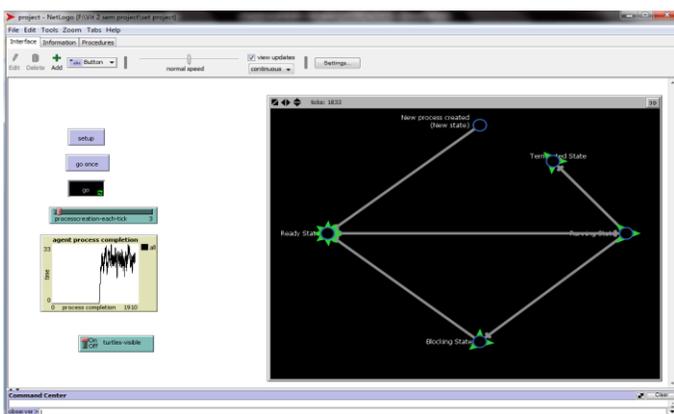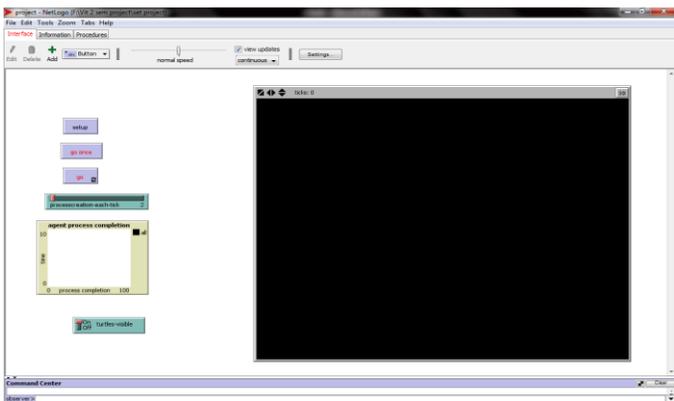
II. Results and Discussion

The simulator on simulating the scenario, will generate a graph showing the rate of change between the X-cordinate with that of Y-cordinate values.
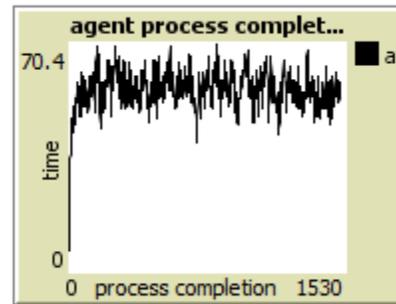
v **Figure 1: Graph showing the relation between process completion (X-axis) and time (Y-axis)**

III. Conclusion

We have generated the proper graph for the simulation scenario that we had designed as an example to prove that NETLOGO simulator is effective for simulating agents in agent based modeling. In future work we can use NETLOGO for simulating other complex systems so that understanding the system becomes easier and NETLOGO prove as a promising simulator for simulating agent based modeling.

IV. References

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