Progress

Highlights
1. Added rank based movement to model
2. Experimented with different radius size to see effect on agent clustering and performance
   Result: Radius=384 had larger performance degradation than Radius=288
3. To see performance differences the environment was changed to have instant regrowth
   (i.e. each iteration the environment resource returns to capacity)

1. Normal distribution clustered environment

Experiment 1:
(G) - Environment growback - ¼ of capacity each iteration
Normal surface: Radius 384
Heights of peak: 16, 32, 256
Runs per height: 15
Results: No change in simulation time

Experiment 2:
(G) - Environment growback - 100% of capacity each iteration
Normal surface radius 384
Heights of peak: 8, 16, 32, 64, 128, 256
Runs per height: ~15
Results: Graph 1

Experiment 3:
(G) - Environment growback - 100% of capacity each iteration
Normal surface radius 288
Heights of peak: 8, 16, 32, 64, 128, 256
Runs per height: ~15
Results: Graph 2

Model parameters: (unless noted above)
Environment size (global): 2048x2048
Agent count (global): 4194304
Iterations: 500
Parents: 16
(M) – Rank based movement (stochastic)
Agents eat only half of the resource *old model had agents eating 100%
Cores on ranger: 64
Decomposition: Global environment evenly divided: 256x256 per core
   Agents evenly divided: 65,536 per core
Results and discussion

Normal cluster surface (Radius = 384)

Graph 1: This graph shows the performance curve of the agent-based model in response to changing the height of the normal distribution clustering of environmental resources. We varied the height from 8-256 in powers of 2 where the base height of the environment is 8 (indicating that height=8 is uniform distribution of environment resources). This graph indicates a 74% performance degradation between uniform distribution and highly clustered environment surface.

Notice: Environment growback is 100% in this experiment.

Graph 2 (Radius = 288)

Graph 2: This graph is similar to Graph 1, except we see only 51% performance degradation between uniform and highly clustered. The difference is changing the radius from 384 (Graph 1) to 288 (Graph 2). Indicating that a larger radius has a bigger effect on clustering the agents leading to performance loss.

Notice: Environment growback is 100% in this experiment.
Figure 1: Example of normal distribution clustered surface with radius=384

Figure 2: Example of normal distribution clustered surface with radius=288