

Project 2

Model Analysis with Butterfly Hilltopping Model



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Prepared for

Math 314: Agent-Based Modeling

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In this lab we are analyzing the Butterfly Hilltopping Model developed in the R&G textbook and during lecture.

Assignment

At the end of R&G Chapter 5 you have developed a Butterfly Hilltopping ABM which imports a realistic landscape. Starting with that code as your basis

1. Modify the model and interface to use a Chooser to select between three different landscapes: “Site Data”, “Two Hills”, “Two Noisy Hills”.
2. Regardless of which landscape is used, the SETUP procedure should create 500 butterflies that are positioned in a 10×10 patch square whose southwest corner is at patch (85,95).
3. Your file should already have the code necessary to compute the corridor width at the end of a single simulation. Now, add a measure of the number of end locations defined as “the number of cells occupied by individuals at the end of each simulation.”
4. Use Behavior Space to run the following experiments:
 - **Experiment 1:** Using the Two Hills landscape, vary q over the range $[0, 1]$ in step sizes of 0.1. Run 20 replicate simulations for each value of q . Report the corridor width and number of end locations at the end of each simulation.
 - **Experiment 2:** Using the Two Noisy Hills landscape, vary q over the range $[0, 1]$ in step sizes of 0.1. Run 20 replicate simulations for each value of q . Report the corridor width and number of end locations at the end of each simulation.
 - **Experiment 3:** Using the Site Data landscape, vary q over the range $[0, 1]$ in step sizes of 0.1. Run 20 replicate simulations for each value of q . Report the corridor width and number of end locations at the end of each simulation.
5. Create a Mathematica file which imports the three files generated from your three experiments. Create box and whisker diagrams showing the variation in the two outputs (corridor width and number of end locations) for each value of q .
6. Create Word document which contains the graphs you created in Mathematica and a paragraph describing how the different landscape and the value of q impact the corridor width and number of end locations. Interpret these results in terms of butterfly's ability to find a mate.
7. **Submit via Box:**
 - Your NetLogo file (P02_YourLastName.nlogo)
 - Your Mathematica file (P02_YourLastName.nb)
 - Your Word document (P02_YourLastName.docx)

Note, you do not need to upload the images created from Mathematica, they will be included in the Word document.