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Progress Report 5/25/15

This project report is more of a project change justification since my project has taken a massive redirection. No longer am I pursuing a cultural assimilation model, but rather I've put my focus towards creating a Bee Pollination and Decline Model. A lot of what's written here will also be in my new project proposal.

Agent Behavior: "The agents of the model will consist of the bees, plants/flowers, and the hive. The patch agents will consist of the grass, but should be able to change colors based on what factors are affecting that patch of grass (pesticides, mites, etc). The properties of the bee agents will be energy, speed, pollen count, and possibly birth rate. Also I want to add a mite? factor and a pollen? factor which is an on/off that states whether the bees have mites or if they're carrying pollen from another plant. The flowers should have a pollinized? Factor, a reproduction rate, and energy. The hive should have a growth rate. For the patches I hope to introduce the pesticides that discolor the patch and affect the energy of the bees. The way the agents will interact is that the bees will start off in the hive and move around randomly until it finds a flower. Once a flower is in its vision, it will approach it and collect pollen. Then it will look for look for more flowers and repeat until its pollen count is full, from which the bee will return to the hive and deposit its pollen. At each flower the bee will have a chance of distributing pollen thus allowing the plant to reproduce and spread seeds which create new plants. When the bees being back enough pollen to the hive, the hive will grow in size (spawning another hexagon next to it). Hopefully I'll be able to implement a system where a mouse click on a patch will place a pesticide on that patch, and change its color affecting the bees and plants that touch it. Also the bees should be affected by a

mite system which affects bees randomly and shortens their lifespans/energy. Later I hope to add in corn syrup diets and deforestation to the model.” (Project Proposal).

System Behavior: The way the overall system works is first it establishes a grassy land with one singular hexagonal hive. Bees will come out of said hive and find flowers, travelling to a number of them before reaching a high pollen count and returning to the hive. At each flower, if a bee is carrying pollen it has a slight chance of pollinating the flower it is currently on. Once pollinated, a flower will have a chance of releasing seeds and spawning new flowers around it. Once a bee returns pollen to the hive, the hive will grow in size, to a certain extent. A bigger hive should mean more bees possible of being stored. In addition to the natural system, users should be able to interact by altering various factors that may affect bee populations. This includes being able to click on patches to apply pesticides, introducing bee mites to the system, changing bee diets to include corn syrup, and getting rid of grassy patches to simulate civilization removing nature to build roads **and towns.**

Rationale: The agents have these rules because they follow the natural instinct of bees. Through research and various sources, I will do my best to accurately emulate the nature of bees and plants. The main issue of bee decline comes from some sort of human involvement with the pollination process or mites that attack the bees, so I will try my best to make natural pollination efficient and make any additional factors harmful in some way.

Questions:

1. Are there any more prevalent factors affecting the decline of bees (more research)?
2. How can I get mouse clicking for pesticides to work?

3. Are there any factors that contribute to more mite attacks on bees?
4. What range should a bee's vision be?
5. Can I use links for anything?

Next Steps:

1. I have my bees, hive, and plants working right now to simulate natural bee pollination.
Now I have to make sure all the spawning works and code that in.
2. I have to implement pesticides, mites, corn syrup diets, and road construction.
3. I have to make sure these factors work together well and prove to be detrimental towards bees.

Model Analysis: The conclusions I can draw from the model presently is that bees are significant in the pollination of my plants, and that there is a relation between the number of bees and the number of plants. So far any other conclusions will come from implementing the detrimental factors of the bees.