

The Real Bee Movie

New Mexico
Supercomputing Challenge
Final Report
April 3rd, 2018

SFHS 109
Santa Fe High School

Team Members

David Salazar-Reyes
Ricky Martin

Team Name

Pepes

Teacher

Brian Smith

Project Mentor

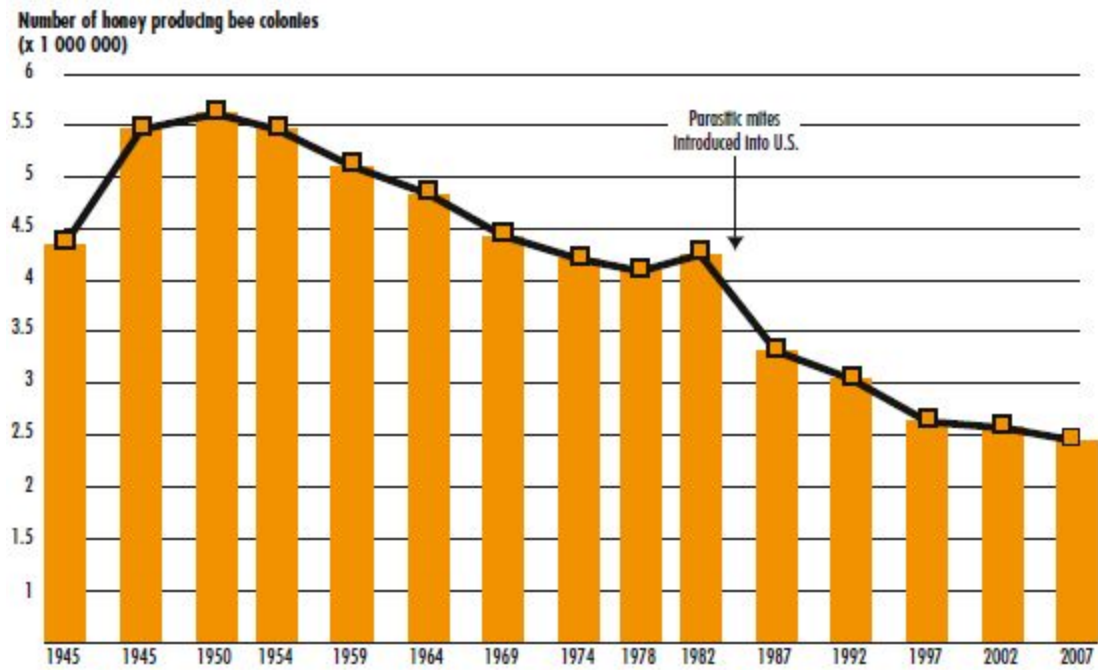
No Mentor for this project.

Table of Contents:

1.....	Title/team members
2.....	Table of contents
3.....	Executive Summary
4.....	Continuation of Executive Summary
5.....	Description
6.....	Continuation of Description
7.....	Results
8.....	Conclusion
9.....	Recommendation
10.....	Acknowledgement
11.....	Bibliography
12.....	Continuation of Bibliography

Executive Summary:

Inside of our project 'The Real Bee Movie', we focus on the declining population of the bees, mainly focusing on the spread of a disease through a push of a button, we can see the graphs that show how the life of bees or plant life decrease when you spread disease. We wanted to focus on the bees because without the life of bees on earth we could really be a species that used to exist as well, through this simulation we can see how fast a disease can spread and how bees can contaminate everything if they catch a disease, the simulation shows how bees carry a disease to the next flower they pollinate then that flower hands it to the next bee that comes it's way then with time you'll start to notice that the flowers inside the simulation will start to lose their color and they'll stop hatching other plants, in real life they don't actually turn grey but this is to signify that the plant is sick, same story with the bees, if they are sick they will start to get a red glow around them, they will as well start to degenerate in life resulting in their death with the ticks that pass. This project is an ecosystem based simulation that shows the life of bees and how catastrophic it could turn if we don't pay attention to the happening.



Description:

In this project we used Netlogo to simulate our world, first we were planning to use Netlogo 3D but we ran into some problems with the wrapping of the world so we decided on doing it on a 2D world in a 3rd person sky perspective. Inside our code we had a couple of globals including sickness and life. In our first button, we use it as a setup for the rest of the world, first we reset the world, clean and reset the map then we spawn the bees, then give the bees some characteristics such as color, shape, size and their variable for life. After that is run, we spawn our flowers, how many spawn are dependent on the sliders controlled by the user that can be found inside the interface, there are four different flowers in our simulation including roses, cosmos, thistles and sunflowers. When the flowers are spawned inside the world they are given a pollination number, size, color and are told to not spawn in the same patch as another flower. After the setup button sets up and spawns all the flowers, you'll be able to see that the world is now setup and is ready for the next button, the go button. The go button is the button that actually runs the simulation and makes everything move. The first thing that this button does is it asks the bees to a random walk which is basically just asking it to set it's heading in a random number between 1 and 90 then to move forward in a number of steps between 1 and 5. While this is happening, it tells the bees that if there aren't any flowers under it that aren't sick, to continue flying, but if there are some flowers under the bee that aren't sick to set it's flying status to false and start to pollinate the flower, after a certain number of ticks, the bee will leave the flower and

because of the pollination process continues to make more flowers, it spawns another flower. Then there is also a command that tells the flowers, if their life equals 0, to die but it can still reproduce another flower so they will never die out. That was the fun button that shows the amazing life of a bee, but there is still one more button that is more sinister and saddening, the Spread Disease button. The Spread Disease button would give one of the bees a sickness and it would start off with that bee roaming around pollinating the flowers but the difference between this bee is that it could give the flower a disease as well, inside the simulation, the bees that are sick will have a red glow so you'll be able to see the difference, the flowers that are sick will lose their color and turn grey. One bee can't transfer their disease directly to another bee but once one flower is sick and another bee comes to pollinate that flower, then that bee will get sick then go sicken another flower and that flower will continue that cycle. But the pretty colors aren't the only thing that the flowers lose, but with every tick that passes while the flower is sick, they start to lose their life and once it hits 0, the flower will die. Then you could see the patterns of life through the graph we setup.

Results:

Through every simulation, there are sometimes a consistent outcome, if there weren't any bees that were sick inside the world then all the flowers will continue to live in a consistent hatching lifestyle and will slowly increase in population, this seems to be a consistent pattern with the normal simulation, even when we spawn the world without a certain flowers, the results seem to stay the same, the results being that the flower population will stay consistent and the bees will continue to pollinate as normal. But these results are completely altered when the sickness is spread, in almost all situations that have the sickness involved, all the flowers will stop reproducing then a lot will start to die out, then the bees will stop moving around as much and will have no type of motivation to continue, there will sometimes still be some flowers that aren't sick and still have their color but the bees will not be able to reach them. But as the sickness first starts off taking off, it doesn't start off fast but with one bee, eventually all of them will get sick, and you can see it inside the simulation that at certain point, the sickness spreads like a wild fire in a dry summer. Some of these results are consistent, some of them aren't and will give you something new every time.

Conclusion:

The problem that we wanted to solve inside our project was seeing the trends of bees and the spread of disease that comes along with it. I think we have a long way to go because our project is very buggy, but we are proud of we accomplished because we know that we did try and we did put time into it, but we have seen how a disease can spread very fast and how it can be spread, this was an achievement as a group effort, we saw how we can work under pressure and how we can work with each other to try to get our goals met, although some of our goals weren't met, we still feel proud of the challenges we did achieve and we saw how we can get things done working together, this was a huge lesson learned, but the goals that weren't met are also essential in learning, in order to fly you must fall. We have arrived to the conclusion that most made sense.

Recommendation:

Inside of this simulation, we recommend to have bees in the actual simulation if you want there to be any kind of simulation type inside of the program, without the bees there would just be sitting flowers and a background, but when it comes down to flowers, you could experiment with the number of flowers you want and what kind of flowers you have inside the world, but it is also recommended that you at least have some flowers inside the world because if you don't, you'll just have a bunch of bees flying around doing nothing, having flowers inside the simulation will give the bees an objective. But besides these things, there isn't a specific way to play with it.

Acknowledgement:

As the whole group, we would like to thank a couple of people in this whole experience that made this a unique and learning project. First we would like to thank our computer science teacher, Mr.Smith, without Mr.Smith this whole project would've fallen apart and we would have been stuck in a lot of the bugs, Mr.Smith has helped us in a lot of our project, he's truly an amazing teacher. The next set of people we would like to thank is the folks at the Supercomputing Challenge for making this whole experience a reality for all these students, this has truly been an awesome experience and a great lesson learned, we learned a lot in this project and that wouldn't have been possible if there wasn't a Supercomputing Challenge to participate and compete in, this has been a unique experience and we will return next year if it's still around. We would also like to thank anyone that gave us a push in the right direction and made us stay on track.

Bibliography

<http://www.pnas.org/content/108/2/662.full>

“Patterns of widespread decline in North American bumble bees” by Sydney A. Cameron,
Jeffrey

D. Lozier, James P. Strange, Jonathan B. Koch, Nils Cordes, Leellen F. Solter, Terry L.
Griswold

Published on January 3, 2011

<http://knowyourmeme.com/memes/bees-are-dying-at-an-alarming-rate>

“Bees Are Dying at an Alarming Rate” by My name Jeff Published May 2017

https://en.wikipedia.org/wiki/Colony_collapse_disorder

“Colony collapse disorder” by Wikipedia

<https://www.globalresearch.ca/death-and-extinction-of-the-bees/5375684>

“Death and Extinction of the Bees” by Joachim Hagopian published November 08, 2017

<https://www.alternet.org/environment/honeybees-are-facing-global-threat-and-if-they-go-so-do-we>

“Honey Bees Are Facing a Global Threat, and If They Go, So Do We” by Reynard
Loki/AlterNet.

