"It is cool to use the bees as biological sensors and combine this with artificial intelligence and machine learning for sustainability."

Kjetil Kalager, Amesto NextBridge

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Using Data Analytics to decode dance patterns of bees

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Business Issue

Bee colonies are slowly declining due to monoculture farming. If the bee populations continue to decline, it will have a large impact on food production.

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The team from Amesto NextBridge in Norway have demonstrated how they can use SAS® Viya® to analyze and read bees' movements in order to move hives closer to flowers for pollination and thus help preserve the bees.

Bees are responsible for pollinating nearly 75 percent of all plant species directly used for human food. Since the early 2000s, bee colonies have been slowly declining, in large part due to monoculture farming. If the bee populations continue to decline, it will have a large impact on food production.

Food production is also impacting the bees. When you see fields and fields of the same type of plants it will bloom for a few weeks and after that there will be nothing blooming for many months. This is a monoculture. Bees will have to find a new food source that could be much further away. The bees thrive in a biodiverse area that provides food all year round.

For the 2020 SAS® Hackathon the team from Amesto NextBridge partnered with Bee Futures. Bee Futures had placed monitors within the hives in order to track the bee movements to discover why the bee population was declining and how to help them thrive. But they were unable to monitor more than one hive at a time and were not able to track the movements in real time.

"By working together with the team from Amesto NextBridge we will be able to collect more information from the bees and find a solution. Together we will march towards a more sustainable future," says Christophe Brod, CEO & founder of Bee Futures.

Technologies used

- SAS® Viya®
- SAS® Visual Analytics
- Python open source
- R open source
- Particle Image Velocimetry open source

Benefit

- Gaining better access to food resulting in a longer lifespan.

- Knowing where the food sources are and where to relocate hives; or where to plant new food sources based on the time of year.

Translating dance moves into distances

After studying the bees, Bee Futures discovered that the bees were moving in two consistent patterns. Either turning around and around, almost aimlessly, or with a constant vibration from their abdomen and turning around in both directions. These distinct movements are called waggle dances. The bee waggle dance is the forager bees way of informing their colleagues about the GPS location of where they should go to find food.

Using algorithms, the team from Amesto NextBridge was able to decode the bees' movements and predict the best possible placement for their hive. This minimizes the amount of time and energy the bee needs to spend to find food and get back to the hive to tell others.

To solve this, the team took video footage from the hive to track the bees waggle dances frame by frame. They could then decode the patterns and translate them into measures of distance that the bees were traveling in order to find food. Using SAS® Viya®, they created a geographical map tracking the movement of the bees in real time. The map will be available to the beekeeper on their cell phone making it easy to track the hives and their bees throughout the day.

The map identifies where the food sources are and where the beekeepers could relocate the hives to optimize conditions; or where to plant new food sources based on the time of year. The real winners in this project are the bees - gaining better access to food resulting in a much longer lifespan.

"There is no doubt that our ambitious data scientists have a passion for contributing to sustainability. When we started the hack, we knew nothing about bees. We have again proved that hard work and scientific experience combined with creativity and dedication can lead to world changing solutions for the greater good," says Kjetil Kalager from Amesto Next-Bridge.

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