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Hive Simulation

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Outline

Advanced model: Environment simulation

- Model overview

- Agents: Assigning jobs

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- Agents: Forager bees

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- Agents: Returning to the hive

- Agent based model: recorded sample clips

Advanced model: Environment simulation

Model overview

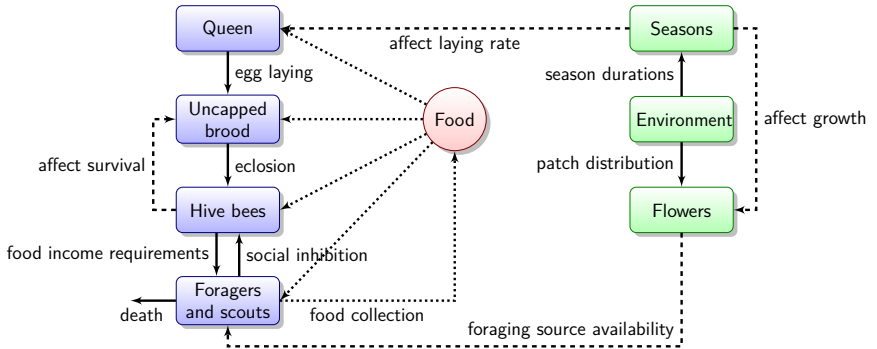


Figure 1: *Honey bee social dynamics and environmental influences covered by our advanced model.*

Agents: Assigning jobs

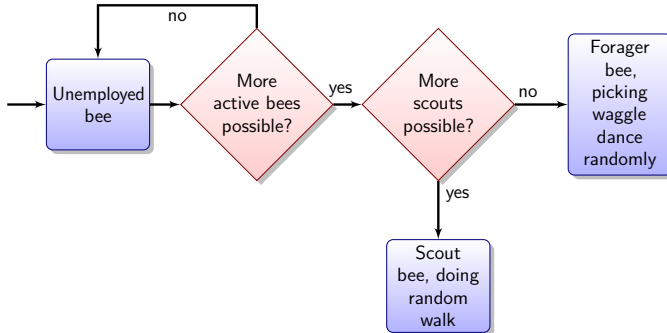


Figure 2: *Assigning jobs to unemployed bees. Scouts and foragers are possible.*

Foragers' distribution across flower patches

- Bees will focus on newly reported and then on the most profitable food sources
- Driving factors for evaluating a patch ($p < q$):
 1. Patch quality (b_w)
 2. Distance from the hive (d_w)
 3. Patch size (A_w)
- Relative evaluation based on what other foraging sources are available

Agents: Scout bees

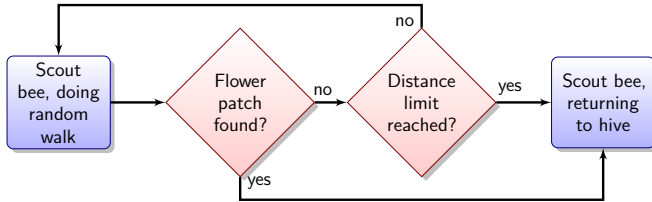


Figure 3: *Scouting behaviour until a flower patch is found or the maximum distance is reached.*

Scouts' random walk

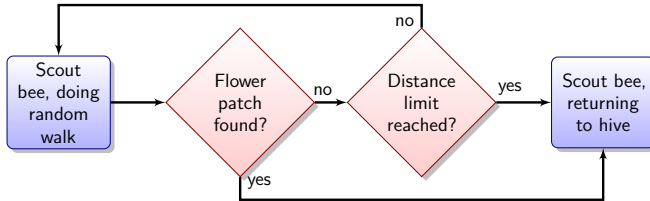


Figure 4: *Scouting behaviour until a flower patch is found or the maximum distance is reached.*

Agents: Forager bees

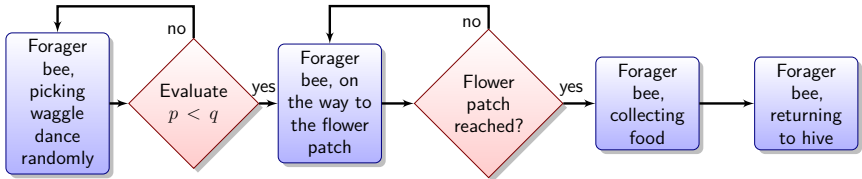


Figure 5: *Foraging behaviour.*

Path optimization

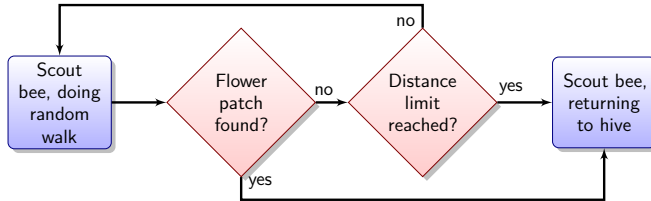


Figure 6: *Scouting behaviour until a flower patch is found or the maximum distance is reached.*

Agents: Returning to the hive

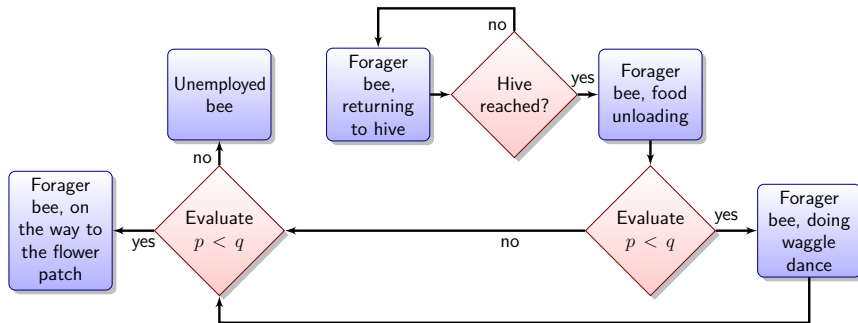


Figure 7: *Forager bee, returning from foraging.*

Agent based model: recorded sample clips

- Day 158, recorded sample with scouts displayed
- Day 158, recorded sample without scouts displayed
- Two different runs, not the same flower patches are being selected

The background of the slide features a honeycomb pattern of hexagons. The top and bottom sections are filled with bright yellow hexagons, while the middle section is a solid dark green. The word "Questions?" is written in white text on the dark green background.

Questions?