

Title:

Potential control strategies for epidemics spreading via migratory populations

Authors:

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Description:

The focus of this research is to understand how population spatial distributions and movement patterns contribute to the likelihood and spread of epidemics. Many populations feature contacts between migratory members moving over long distances mixing with stationary members moving only in a home range. The properties of epidemics can be explicitly studied for these populations. Examples include avian influenza (migratory wild birds and stationary domestic birds), equine influenza (migratory racehorses and stationary hobby horses) and human diseases with migratory or displaced populations (e.g. war refugees in Africa).

The case study for this research is the potential spread of a parasitic mite amongst honeybees (*Apis mellifera*) in Australia. The population of honeybees in Australia is divided into (1) managed colonies, moved several times per year by migratory beekeepers and (2) feral colonies; a stationary self-sustaining wild population of *Apis mellifera*. Utilising spatial data and analysis, a computer model will be constructed to deduce the spatiotemporal distribution of both stationary and migratory subpopulations. Migratory movements are the consequence of beekeepers making decisions based on current and anticipated floral resource availability. For this reason, Agent Based Modelling has been chosen for the modelling framework, as it has the ability to simulate behaviours in a geographic space.

Underpinning conventional control strategies is the notion that when an outbreak is detected, population movements should be restricted. This research questions the validity of that assumption, and attempts to demonstrate alternative control strategies with equal or better performance.

Biography:

Jonathan Arundel is a PhD student at the University of Melbourne. Prior to returning to full-time study, Jonathan worked for ten years in the telecommunications industry. Jonathan is now also a registered and qualified beekeeper, and hopes to get his first hives next spring.

Stephan Winter is a researcher at the University of Melbourne. His expertise is in modelling space and time for the purposes of wayfinding and navigation, transport and change detection.