

Case study: an epidemiological model

ExModelo Summer School

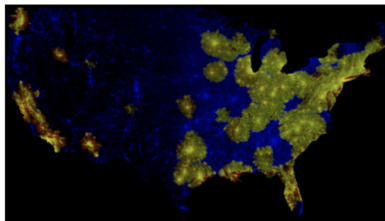
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OpenMOLE

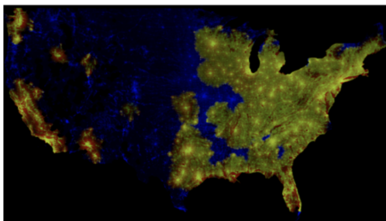
June 17, 2019



(c) 1 Week



(d) 2 Weeks



(e) 3 Weeks

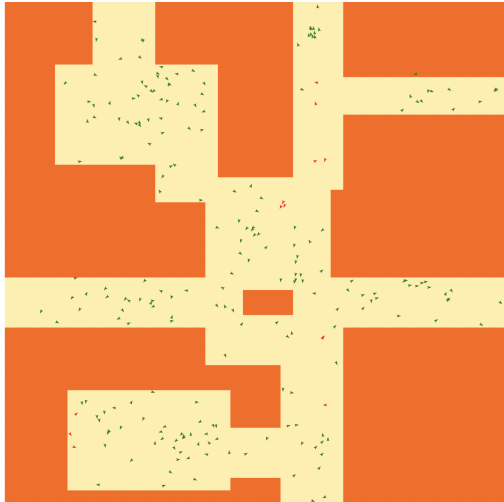
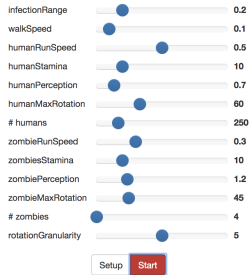


(f) 4 Weeks

Simulation of the 2010 Zombie outbreak in the US [Alemi et al., 2015]

- ▶ 2007: first outbreak in Island, relatively contained through ad-hoc measures
- ▶ 2010: it becomes pandemic
- ▶ 2010-2015: no clear records of events
- ▶ 2015-2018: reorganization of institutions, the MOLE (Medical Overview of Ludicus Experiments) center in Chongqing gathers observational from many local invasions across the world
- ▶ 2019: they released the first version of the model ZOMBIE (Zone of Optimal Management for Bacillus Infecting Everyone) is released and successfully applied

An operational model for local Zombie invasion



- ▶ Simulate agent-level collective movements at the scale of a district
- ▶ Include behavioral processes for human (panic, search for rescues, ...) and zombies (self-organization, spontaneous attacks, ...), which can be adapted to local settings
- ▶ Include realistic pedestrian dynamics and realistic spatial configuration, which can be applied to local configuration

Objective of the model: optimal policies and behavioral prevention to minimize the impact of recurring invasions

- ▶ Try the GUI and changing parameters
- ▶ Most of next courses will be based on that model (additional processes will be detailed when needed)



Alemi, A. A., Bierbaum, M., Myers, C. R., and Sethna, J. P. (2015).

You can run, you can hide: The epidemiology and statistical mechanics of zombies.

Physical Review E, 92(5):052801.