Compartment model of epidemic spreading in complex networks with mortality

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We study epidemic spreading in complex networks by a multiple random walker's approach. Each random walker performs an independent simple random walk on a connected complex random graph such as the Barabasi-Albert (BA), Erdös-Rényi (ER) and Watts-Strogatz (WS) type graphs. We assume, both walkers and nodes can be infected. They are in one of the compartments, susceptible (S) or infected (I) representing their states of health. The transmission of the disease happens as follows. Susceptible nodes may be infected by visits of infected walkers, and susceptible walkers may be infected by visiting infected nodes. No direct transmission among walkers are possible. This model mimics the class of diseases such as Dengue and Malaria with transmission via vectors (mosquitos).

In addition, for infected walkers, we account for the possibility that they may die during a random duration of their infection time (by introducing an additional compartment of dead walkers), whereas infected nodes never die and always recover after a random period of infection. We implement this random walk model (using PYTHON NetworkX library) and perform simulations to explore the compex interplay of the topology of the network and the propagation of the disease. An animated simulation can be seen by clicking here.

References

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5. Supplementary materials (Simulation films and Python Codes):
https://sites.google.com/view/scirs-model-supplementaries/accueil