Approximate clustered epidemic networks

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The contacts capable of spreading infection in the human population can be modelled as a network. Empirical measurement of such contacts quickly shows that they do not correspond to any random graph model that can be currently solved analytically [2].

One particular property of networks that is particularly difficult to deal with analytically is the presence of many short, closed loops. General considerations suggest that this will tend to slow an epidemic's growth significantly without such a strong effect on the final outcome [3].

This project will consider improving understanding of clustered epidemic dynamics. One possibility is whether random graph models can be developed that more accurately reflect real contact data than existing approaches. Data from the Social Contact Survey [2] are immediately available for such a purpose.

Another possibility is to consider an epidemic process that generates the network as it spreads [1] to generate an 'effective degree' model [5] to which dimensional reduction techniques can be applied [4]. This will capture key features of clustered epidemics, to give insights about what data are really required to understand their behaviour.

[Project developed with Alex Bishop]

References

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