**COVID19-SIMULATION**   
  
The model mimics spread of disease in networks of communities that are accessible by road and air transports. It consists of a graph with N nodes {} and R links which connect . The health of nodes evolves in time. Initially, at time t=0, we assume all nodes is at state . This represents the normal functioning of the nodes. This functioning is disturbed when the neighboring nodes encounter some disturbances, resulting in . However, these nodes have the so-called threshold parameter, which can be tuned by changing . The interaction of a node with neighboring nodes is modeled by the following coupled differential equations:

In equation (1), the first term represents the ability of a node to heal itself once it is diseased. The second term represents the net affect towards a node due to disturbances at its neighboring nodes; the healing rate is denoted by . The function reflects the robustness of a node to external disturbances, where is the out-degree of node j. is the health of node at time . However, the time-dynamics of the node is principally invariant of this time-shift, so , should not change the results.

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| **Resources and documentation:**  Buzna, Lubos, et al. "Efficient response to cascading disaster spreading." *Physical Review E* 75.5 (2007): 056107  Pournaras, Evangelos, et al. "Sfina-simulation framework for intelligent network adaptations." *Simulation Modelling Practice and Theory* 72 (2017): 34-50 |
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**Installation:**

1. Install python2 or python3
2. Install mpeg, and put the path in your python interpreter
3. Put shapefile.py in your python path also. This file helps make map of Nepal
4. Run code *covid19nepal.py.* It produces a bunch of images in .png. Use *ffmpeg -r 0.5 -f image2 -s 1920x1080 -i covid%04d.png -vcodec libx264 -crf 25 -pix\_fmt yuv420p video.mp4*

Enjoy the video!

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