

Reasoning for construction of belief network

The first level of the network is the vertices, the probability that a vertex has evacuees is given as an input and isn't influenced by any other entity. So the probability of each of the vertices at the first level being true is given as an input.

At the second level we have all probabilities of the edges being blocked at time 0. At time 0, the probability of an edge being blocked is only determined by the probability of evacuees at each of the vertices its connected to. So each vertex at the 2nd level is connected to both of the vertices at the first level which represents the vertices the edge is connected to. The table is determined by the probability you gave us($0.6/\text{weight}$) for each of the edges, and for both edges: $1-(1-0.6/\text{weight})*(1-0.6/\text{weight})$.

Then from the third level onwards, each vertex at the level is connected to the vertex which represented the same edge at the previous level. The probability is determined by the persistence constant which is given as an input (otherwise 0.01 as the leak).

Interpretation method

We used the importance sampling, which is a twist on normal monte carlo sampling. How that works is that unlike regular sampling, this time each sample has a weight based of the evidence, if the results of the test give a low chance for the evidence to turn out like it did, the weight of that sample will be lower, and vice versa. That helps us normalize the sampling given some evidence without the need to reject samples and thus waste precious time.