Markov cellular automata as models for chronic disease progression

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Abstract

In a joint project with Donna Molinek, we analyze a Markov cellular automaton that models the spread of viruses that often progress to a chronic condition, such as human immunodeficiency virus (HIV) or hepatitis C virus (HCV). The complex dynamical system of virus dynamics often produces a Markov process at the later stages, whose eigenvectors corresponding to the eigenvalue 1 have physical significance for the longterm prognosis of the virus. Moreover we show that drug treatment leads to chronic conditions that can be modeled by Markov shifts with more optimal eigenvectors.