SEQUENTIAL REPROGRAMMING OF BIOLOGICAL NETWORK FATE

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Abstract: Network controllability is a major challenge in network medicine. The problem is to rewire the molecular network for reprogramming the cell fate. The reprogramming action is considered as a control usually performed once. However, in some cases, a therapy has to follow a time-scheduled drug administration protocol. Furthermore, some diseases are induced by a sequence of mutations leading to a sequence of actions on molecules. In this paper, we extend the single control action method by investigating the sequential control of Boolean networks. We present a novel theoretical framework for formal study of control sequences, leading to algorithms resolving the PSPACE-hard problem of inferring minimal parsimonious control sequences under the synchronous dynamics.