

Modularizing the Control Search for Biological Systems

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Controlling biological networks is often achieved by targeting a few key regulatory nodes. However, finding these control targets can be a complex and difficult task. Decomposing the network into modules can make the control problem more tractable. This talk will present a method for modularizing the control search for biological systems. We use a decomposition theory for Boolean networks to guarantee a unique collection of subnetworks. This allows us to restrict the control problem to each module, and then combine the controls of each module to control the entire network. We will also discuss theoretical results that exploit the structure of the regulatory functions to exclude certain modules from the control search. We applied our approach to a large model of pancreatic cancer cells and their microenvironment to identify different sets of controls.