The phenotype control kernel of a biomolecular regulatory network

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Supporting information

Comparison of PCK with a target control method

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The target control method in (9) provides the set of driver nodes that is enough to drive the Proliferation node in the simplified MAPK network to have its desired state value by using the greedy algorithm in (9), which constructs a series of bipartite graphs: Step1. Construct a bipartite graph, where the right side consists of the Proliferation node, and the left side consists of all the nodes that can reach the Proliferation node, so the nodes in the left side are the two nodes p70 and MYC. Step2. Find a maximum matching, the maximum set of directed links that do not share start or end nodes in the bipartite. The maximum set can be the singleton set of the link from p70 to Proliferation, which is denoted by a red dotted line in the 1st bipartite as in the below figure. Step3. Replace the Proliferation node in Step1 and Step 2 with p70 and repeat Step1 and 2 until no new bipartite graph can be constructed. The series of bipartite graphs consists of the following four bipartite graphs and the 5th bipartite graph cannot be constructed since there exists only one node (PPP2CA) in the left side of the 4th bipartite graph and no node can reach the PPP2CA node.