

A Design Method of Artificial Genetic Circuits on Effective Search of These Logical Structures

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In the context of synthetic biology, artificial genetic circuits are designed in the following way: after setting a biological target phenomenon to be investigated, reaction parameter estimations among related molecules are conducted based on the dynamic analyses with mathematical models, finally, a system of biological reactions is developed with these molecules in vivo or in vitro. It is desired to develop an effective method to select the suitable circuits for realizing the target phenomenon, because not a few models are possible as candidates for the target phenomenon.

We propose a new procedure to effectively design a mathematical model by the following two steps. The first step is the process creating possible structures of the mathematical by a logical technique. The second step is the process creating dynamic models in two ways; a system of differential equations for the analysis of dynamics in the model and a model of hybrid functional Petri net as a common platform for knowledge sharing between biologists and computer scientists.

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