
Synthesis of Boolean Networks from Biological Dynamical Constraints using Answer-Set Programming

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Résumé

We rely on Answer-Set Programming to express the synthesis of discrete dynamical models (Boolean networks) from biological dynamical constraints. This inference from knowledge and data confronts both a combinatorial issue and a high complexity, while Boolean networks constitute easy-understandable modeling to guide research on biological processes.

We offer a scalable method addressing types of data beyond the scope of previous approaches while allowing exhaustiveness. We implemented new constraints to ensure stable behaviors, positive and negative reachability between observations of the system. This contribution is described in our paper published in ICTAI 2019. We are currently working on the encoding of constraints enabling the check of global properties, describable by quantified Boolean formulas.

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