MUNI
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Control extension for the Biodivine AEON online tool

Introduction

This document provides a detailed specification of the control extension for the Biodivine AEON online tool. The aim of the extension is to expand the original AEON tool with functionality needed for control over partially specified Boolean networks (PSBNs).

Description

The control tool extension upgrades the original graphical interface of the online AEON tool with functionality required for the control over PSBNs.

New functionality includes:

- the modification of models with data needed for performing the control task (setting controllability of nodes, adding nodes into calculated phenotype)

- the expansion of the Compute Engine module with new setting features (switching between attractor analysis and control mode, settings for the control mode, settings for the attractor analysis, general settings for the AEON tool)

- the rework of the Layout module into Network Visualization Options module containing original layout functionality and ability to show data about network in its graphical representation

- a new form of the Result module for visualization of control results (tables, graphs, graphical exploration)

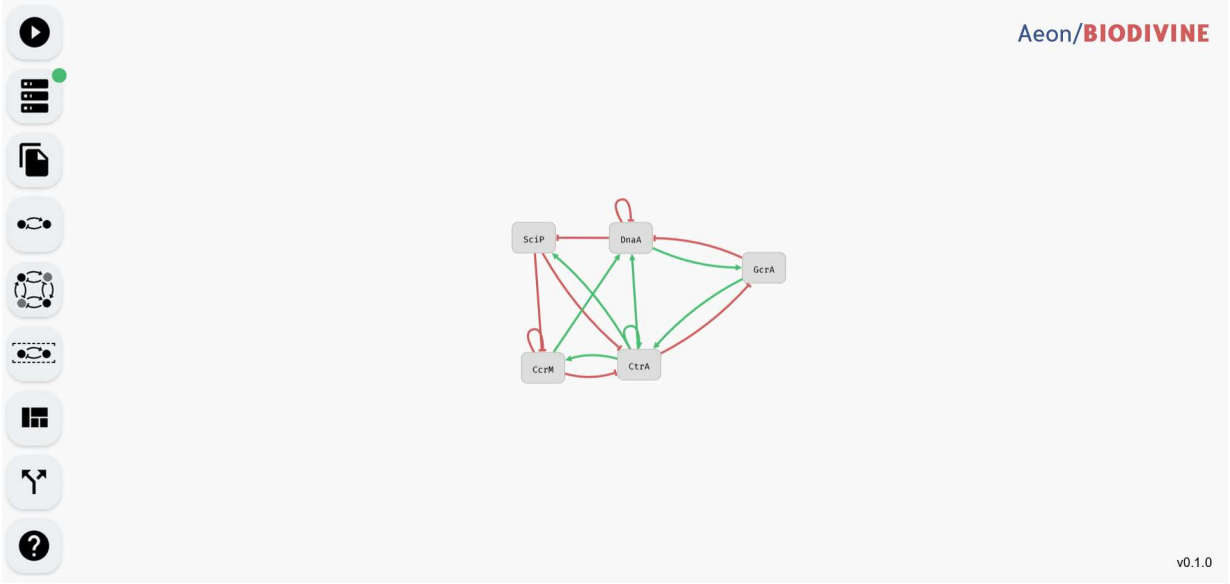
- the expansion of the Model Editor module to show data about control (each node has information about its controllability and its status in connection with currently set phenotype)

- the expansion of the original AEON file format with saved control data (controllable nodes, phenotype)

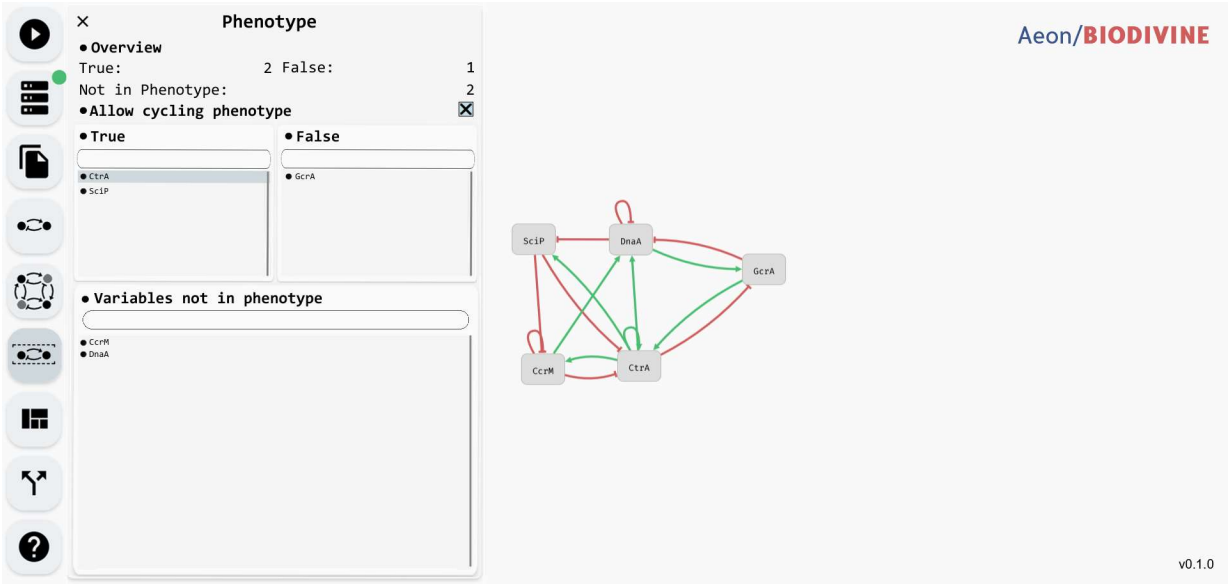
Used technology

This extension uses mostly JavaScript programming language, in which the original AEON online tool is written. The whole computational part uses AEON.py Python API which provides calls into the Rust backend. This API provides all the necessary functionality for performing control over PSBNs.

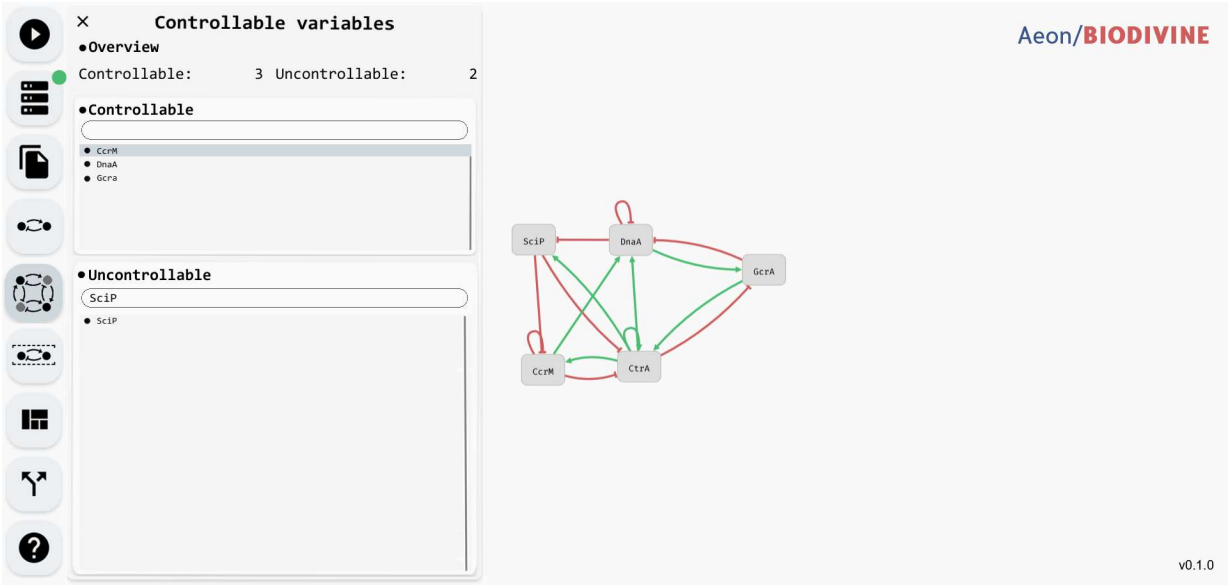
Possible design



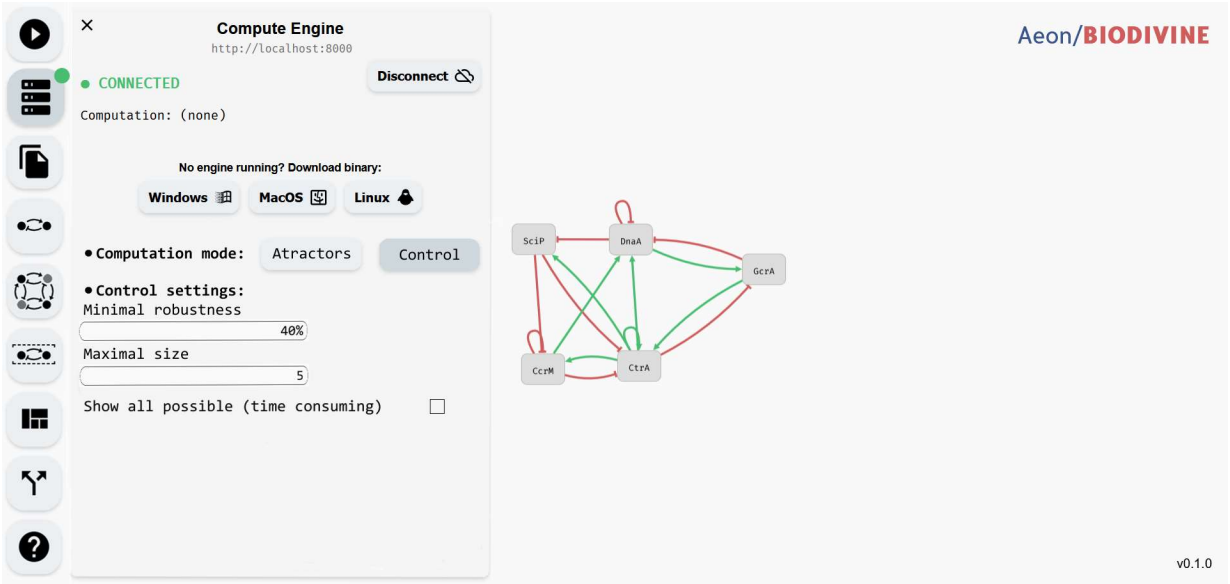
1. Redesigned side bar – added modules for controllability and setting of the phenotype.



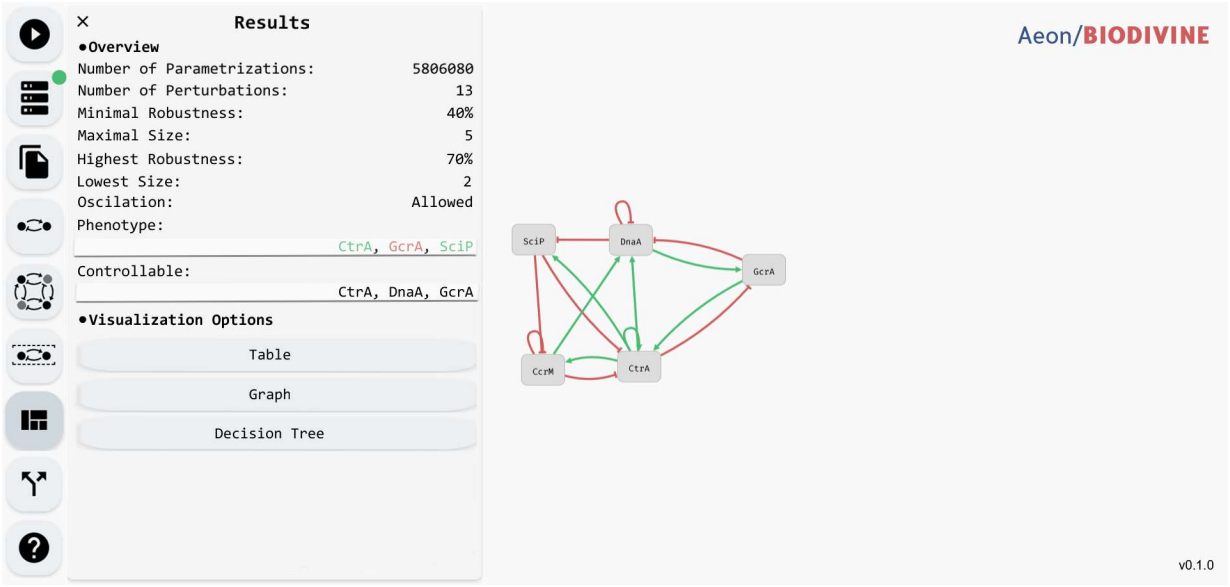
2. Design of the phenotype module – contains three tables one for variables absent from phenotype and two for values present in the phenotype divided by their fixed value.



3. Design of the Set Controllable module – contains two tables one for nodes which are uncontrollable and one for nodes which are set as controllable.



4. Redesign of the Compute Engine module – added switch for changing the computation modes and settings of the control computation.



5. Design of the Results module for control computation – contains overview of the calculated results and buttons for all possible visualization of results.

6. Design of the Table Results visualization – overview of the calculated results and filters for better orientation in the table.