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Functional Specifications

1. Background

Systems Biology Markup Language is an HTML-like language used to model biological and chemical reaction networks. One way it is used is to visualize reaction networks, for example, in SBMLDiagrams, which uses an SBML network to output an image with each species in a reaction and the arrows showing the interactions between the species, or the reactions themselves. SBMLDiagrams requires the use of writing an Antimony model and loading it into tellurium.

SBVisualizer is a visualization tool that allows the user to view the fluxes of each reaction by changing the arrow thickness and color based on the flux determined by each reaction. The thickness of the arrow is determined by the flux value and the color is determined by how positive or negative the flux is.

2. User profile

The ideal user of SBVisualizer is someone already familiar with Python programming. The user should also have a background in knowing how to write Antimony models and how to load them into tellurium. While the user doesn't have to have a thorough knowledge of SBMLDiagrams, since many of the functions of SBMLDiagrams are used in SBVisualizer, they should generally know how the SBMLDiagrams visualization functions work, like how changing arrow colors and line thicknesses work. However, much of that functionality is embedded into SBVisualizer. Being familiar with SBMLDiagrams does allow the user to know how to properly scale the drawing to get the view they want, and make the drawing look presentable, since that is similar to SBMLDiagrams.

3. Use Cases

One use case is the user wanting to view the relative flux of each reaction using line thickness. They would use SBVisualizer to get the thickness of each line for each reaction, which is scaled to a set minimum and maximum, from which the thicknesses of the other lines are normalized to.

Another use case is the user wanting to view the relative flux of each reaction using arrow color. They would use SBVisualizer to get the color of each line for each reaction, which is determined based on an RGB scale, where pure red represents the most positive flux, pure green represents 0 flux, and pure blue represents the most negative flux out of all the reactions.

The user can also combine the two to view the flux based on both arrow thickness and color.