

ReConn: Explore past the edges of pathways

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Introduction

In Systems Biology metabolic pathways are an essential subject of study. The basic unit of a pathway is a reaction, and in recent years new databases have become available in which reactions are stored. Reactome is such a database aimed to gather information about all reactions that take place in a cell. Among other parameters, this information includes in which cell compartment a reaction takes place. Because the Reactome datastructure is open, kinetic parameters can be added to the database, resulting in a database well-suited for Systems Biology. The reactions can be regrouped into pathways, however the Reactome website does not offer full use of the graph structure in Reactome. Therefore we have developed ReConn - a plugin for Cytoscape, an open source graph visualization tool written in Java. The main purpose of ReConn is to connect Cytoscape to the Reactome database.

Features

ReConn currently offers the following features:

1. Loading pathways by name.
2. Generating a new pathway by taking a given metabolite as a starting point. By the coupling to Cytoscape all reactions that are related to the reactions that consumes the given metabolite can be displayed.
3. Data (e.g. from micro-array experiments) can be visualised on a pathway. This data is visualized by changing the node colours. A new plugin allows to show multiple colours in one node, hence multiple datasets can be studied in one single view.
4. ReConn can also work in the opposite direction: the user can see how the data is mapped onto the various pathways of Reactome. And then select the pathway of interest by looking at the data, instead of starting with a pathway.
5. ReConn can generate a subgraph containing all paths from one reaction to another. It is also possible to exclude certain reactions from this subgraph.
6. Extend pathway with hypothetical neighbours. Extend the pathway with reactions that either produce or consume metabolites used in the pathway.

In particular features 2, 5 and 6 are, to our knowledge, not present in any other metabolic pathway tool.

