

## **Title: Cytoscape Web: An interactive, customizable web-based network browser**

Authors: Christian Lopes, Max Franz, Quaid Morris, Gary D. Bader

Author Affiliations: Donnelly Centre for Cellular and Biomolecular Research, University of Toronto, Toronto, Canada  
gary.bader@utoronto.ca

URL for overall project website: <http://cytoscapeweb.cytoscape.org>

URL for accessing the code: <http://cytoscapeweb.cytoscape.org/download>

Open Source License being used: GNU Lesser General Public License

Cytoscape Web is an interactive, web-based, open source network visualization tool, which is freely available at <http://cytoscapeweb.cytoscape.org>. With some basic programming skills, Cytoscape Web can be customized and incorporated into any website. Because it is a pure client-side component, developers can choose any server-side technology, if necessary. The main network display is implemented in Flex/ActionScript, but a JavaScript API is also provided, so the website can rely on web standards (HTML, CSS, JavaScript) for embedding and interacting with Cytoscape Web.

Like Cytoscape, Cytoscape Web allows the client application to define custom node and edge attributes before loading the network data or even after it is rendered. Node and edge visual styles (e.g. color, size, opacity) can be dynamically changed by: (a) specifying default visual properties for all elements; (b) mapping node and edge attributes (name, interaction type, weight, etc.) to visual styles; (c) overriding default or mapped styles by setting a bypass style. These three options provide flexibility and allow each Cytoscape Web based application to have its own semantics, styles and features. For example, iRefWeb (<http://wodaklab.org/iRefWeb/>), an interface to the relational database interaction Reference Index (iRefIndex), uses a basic implementation of Cytoscape Web to display all interactions in which a single queried gene participates. Alternatively, GeneMANIA (<http://www.genemania.org>), a gene function prediction webserver, uses a more advanced implementation of Cytoscape Web to extend a users' input gene list and illustrate interactions among the genes. Cytoscape Web communicates with GeneMANIA to display gene or network specific highlights and associated information in real time.

A Cytoscape Web tutorial, with ready-to-use samples, and the API documentation can be accessed at the Cytoscape Web website. Developers will also find a demo application showcasing more advanced features that can be built around Cytoscape Web (<http://cytoscapeweb.cytoscape.org/demo>) and these can be freely used as a template for building similar web sites.