Tutorial:Introduction to Cytoscape 3

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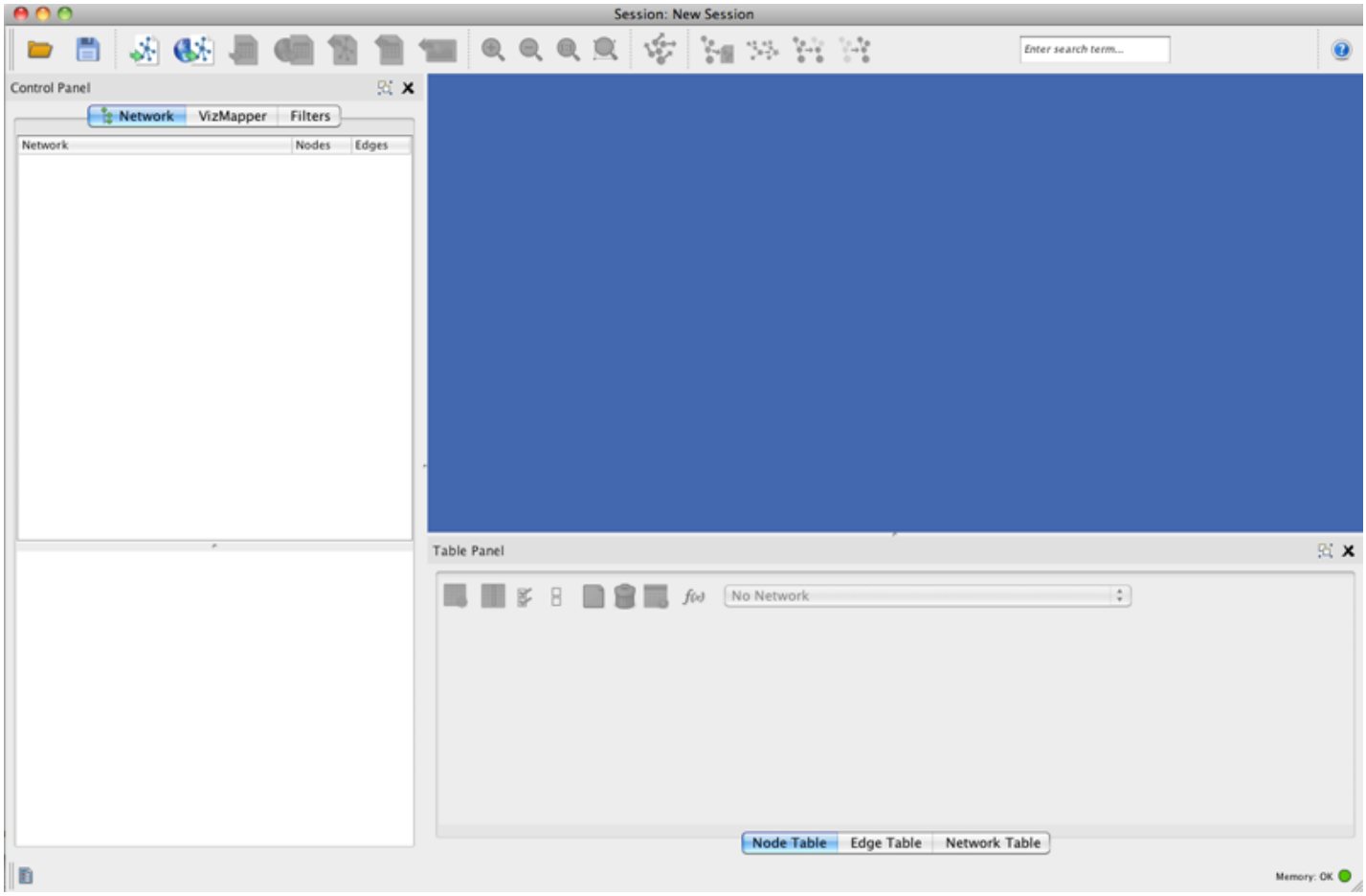
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Cytoscape is an open source software tool for *integrating*, *visualizing*, and *analyzing* data in the context of networks. This tutorial describes the Cytoscape 3 user interface.

Cytoscape 3 User Interface

Launch Cytoscape 3. You should see a window that looks like this:



- At the top of the Cytoscape 3 Desktop window is the toolbar, which contains command buttons. The name of each command button is shown when the mouse pointer hovers over it.
- In the upper right is the Main Network View window, where network data will be displayed. This region is initially blank.
- At left is the Control Panel Panel. The Network tab of the Control Panel lists the available networks by name and provides information on the number of nodes and edges.
- Immediately below the Control Panel is the Network Overview Pane
- At lower right is the Table Panel which can be used to display node, edge, and network attribute data

The Control Panel and Table Panel are dockable panels known as CytoPanels. You can undock any of these panels by clicking on the Float Window control in the upper-right corner of the CytoPanel. The Table Panel starts off with three tabs: **Node Table**, **Edge Table**, and **Network Table**; the Control Panel starts off with three tabs: **Network**, **VizMapper** and **Filters**. Loaded apps might add tabs to either of these CytoPanels.

Cytoscape 3 Toolbar

The Cytoscape toolbar contains short-cut icons for many common tasks:

- Open and Save Session
- Import network from File, URL and table
- Export network to file and image
- Export **Data Table** to table
- Zoom controls
- **Apply Preferred Layout** will apply a specific layout algorithm, as defined in **Layout → Settings...**.
- A set of network manipulation tools for creating a new network from selection, selecting first neighbors and hiding/showing nodes/edges.
- The **Search** input field. The Cytoscape 3 search tool is the previously described Enhanced Search (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2427162/) , which is based on the Lucene (http://lucene.apache.org/) information retrieval library. The query syntax can specify attribute fields to restrict searches, accepts Boolean logic operators to search multiple attributes, and wildcards for string values to search multiple fields. For example, the search "ynr050c*" will find all nodes and edges with "ynr050c" as prefix in any of the columns.

Cytoscape 3 Menus

Below is a brief summary of the menus in Cytoscape 3.

File

The File menu contains basic file functionality:

- **File → Recent Session** for opening a recently opened Cytoscape session file
- **File → New** for creating a new network
- **File → Open** for opening a Cytoscape session file
- **File → Save** for saving a session file
- **File → Save** for saving a session file
- **File → Import** for importing data such as networks and attributes
- **File → Export** for exporting data and images.
- **File → Run** for running a Cytoscape script file
- **File → Print Current Network** allows printing

Edit

The Edit menu contains options for manipulating networks and network views:

- Copy, Cut and Paste editing functions.
- Undo and Redo functions which undo and redo edits made in the Table Panel and the Layout.
- Options for creating and destroying views (graphical representations of a network) and networks, and for renaming the network.
- Options for deleting selected nodes and edges from the current network.
- Options for removing duplicated edges and self-loops.
- **Edit → Preferences → Properties** to edit preferences for properties and plugins

Note: All deleted nodes and edges can be restored to the network via **Edit → Undo**.

View

The View menu allows you to display or hide:

- The Control Panel
- The Table Panel
- Results Panel. When displayed, the Results Panel appears in the upper right corner of the Cytoscape window.
- Tool Panel. When displayed, the Tool Panel appears in the lower left corner of the Cytoscape window, overwriting the Network View Panel.
- **Maximize Inner Desktop** hides all panels except the Main Network View Window.
- **Show/Hide Advanced Visual Properties** controls which properties are displayed in the **VizMapper**, either all or a default subset.
- **Open Custom Graphics Manager** lets you edit the library of custom graphics.
- If multiple network windows are present, you can control how to display them under **Arrange Network Windows**.

Select

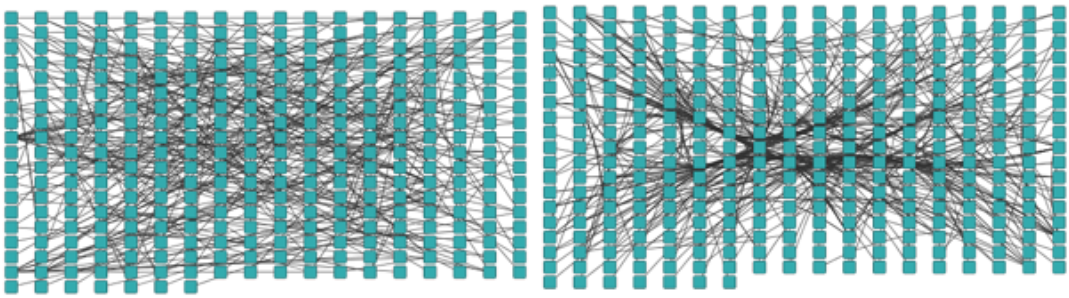
The Select menu contains options for selecting and viewing nodes and edges:

- **Select → Mouse Drag Selects** controls what is selected upon mouse drag, either nodes, edges or both.
- **Select → Nodes** and **Select → Edges** both contain sub-menus for options related to selected nodes and/or edges, such as selecting first neighbors of selected nodes, selecting/deselecting all, showing all, and inverting the selection.
- The **Select → Use Filters** option allows filters to be created for automatic selection of portions of a network whose node or edge attributes meet a filtering criterion (see below for the filters section).

Layout

The Layout menu has an array of features for visually organizing the network:

- **Layout → Bundle Edges** will bundle multiple edges between two nodes into one edge, for the current selection of nodes and/or edges. Below you can see the affect of edge bundling on a simple network.



- **Layout → Clear Edge Bends** will change the visualization of all edges to straight, as opposed to bent. Below is a simple network before and after clearing edge bends.



- Rotate, Scale, Align and Distribute are tools for manipulating the network visualization.
- The bottom section of the menu lists a variety of layout algorithms which automatically layout a network.

Apps

The Apps menu contains one entry for the App Manager, which has options for managing your apps (install/update/delete). The Apps menu will also have entries for any installed apps.

Tools

The Tools menu gives you access to a set of specialized tools:

- **Tools → Network Analyzer**
- **Tools → Merge Networks** allows you to merge a selected set of networks.
- **Tools → Workflow**

Help

- The Help menu allows you to launch the help viewer and browse its table of contents.
- The "About…" option displays information about the running version of Cytoscape.

Context menus

Cytoscape 3 has a set of context menus, for networks, nodes, edges and annotations:

Network context menu

- **Add → Edge (and possibly Nodes) using SIF..." lets you enter interactions and nodes in a simple SIF interpreter.**
- **Add → Node** adds a node.
- **Add → Arrow Annotation** lets you add a customizable arrow to an image or shape annotation. The other end of the arrow can be attached to a node or other annotation.
- **Add → Image Annotation** lets you add any image to the network. The image can be re-sized and positioned immediately after it is placed on the canvas. Moving and re-sizing after it has been placed is possible through the **Edit** context menu on the annotation.
- **Add → Shape Annotation** lets you add any shape to the network. The shape can be re-sized and positioned immediately after it is placed on the canvas. Moving and re-sizing after it has been placed is possible through the **Edit** context menu on the annotation.
- **Add → Text Annotation** lets you add a text label to the network.
- **Add → Bounded Text Annotation** lets you add a text label within a customizable bounding box to the network. The bounding box can be re-sized immediately after it is placed on the canvas. Moving and re-sizing after it has been placed is possible through the **Edit** context menu on the annotation.

- The **Edit** menu contains copy, cut and paste options.

- **Edit → Bypass Visual Style** lets you select from a set of properties for which to bypass the current visual style. You can also select to **Reset All**.

- The **Group** menu options are active only when multiple nodes are selected, with options to group and ungroup selected nodes.

- The **Apps** menu contains options added by installed apps.

- **File → Export** provides options to export the network in a network format, or to export the network view as a graphic.

- **Layout** provides quick access to the yFiles layout algorithms and to an option for bundling edges. For more information on edge bundling, see the Layout section.

- **Select** provides quick access to selecting and displaying/hiding nodes and edges.

Node context menu

- The **Edit** menu contains typical editor options (Copy, Cut) and also lets you add an edge to a single node or connect a set of nodes with edges. It also has the option to **Bypass Visual Style**, for properties relevant to nodes and nested networks.

- **Select → Select First Neighbors (Undirected)** provides quick access for selecting all first neighbor connected nodes.

- The **Group** menu has options to group and ungroup selected nodes, and also to collapse and expand selected groups.

- The **Nested Networks** menu contains options for adding and removing a nested network and an option to go to the nested network.

- **Apps → Extend Network by public interaction database** allows you to quickly access interactions in public databases for a particular node, using PSICQUIC web services. If interactions are found, you can choose to add them to the network.

- **File → Export** provides options to export the network in a network format, or to export the network view as a graphic.

- The **External links** menu lets you search for the selected node at a variety of public databases and resources.

- **Preferences → Group Preferences...** lets you define how groups are displayed and handled.

Edge context menu

- The **Edit** menu contains typical editor options (Copy, Cut) as well as quick access to the **Clear Edge Bends** function. It also has the option to **Bypass Visual Style**, for properties relevant to edges.

- The **External links** menu lets you search for the selected edge at public interaction, ontology and publication databases.

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