## CYTOSCAPE PART II

3 types of network integration : integration with knowledge (enrichmap), integration of different networks, integration of expression and networks (jActive)

## Integration of different networks : Networks of Networks

- Load the 3 different networks available in Github in Cytoscape (PPI.gr, Pathways.gr, Complexes.gr)
- What is the intersection between the 3 networks? Between PPI and Complexes?

Use Tools -> Merge -> Intersection

- Focus on the PPI\_Complex intersection network, extract the largest connected component (with NetworkAnalyzer) and run an partitioning algorithm (with Clustermaker -> Network Cluster Algorithm -> MCL Cluster)
- See clusters with Clustermaker -> clusterMaker Visualization -> create network from cluster. You can also use create Results Panel from Clusters, or use the "Style" table to color clusters (Discrete mapping => right click, Mapping value generator)
- (If we have time), repeat with MCODE algorithm to see the different clusters obtained

## Integration of Expression and Networks (jActive)

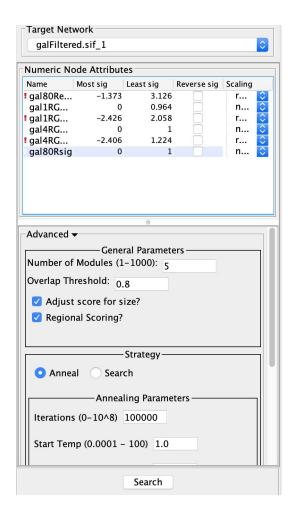
(this tutorial is inspired from

http://opentutorials.cgl.ucsf.edu/index.php/Tutorial:JActiveModules 3)

- Install the jActiveModules App either from within Cytoscape 3 (Apps → App Manager) or directly from <a href="http://apps.cytoscape.org/">http://apps.cytoscape.org/</a>
- Open the galFiltered.sif network via File → Import → Network from File....
- Some of the network edges are directed ('pd'), other are not ('pp'), draw the directed edges with an arrow
- Load the expression data matrix galExpData.csv using the File → Import → Table from File.... This file contains expression results for three sets of expression analysis, involving perturbation of three transcription factors involved in the yeast galactose utilization pathway.

This file also contains a necessary ingredient for jActiveModules: p-values indicating the significance of each expression value.

- Color nodes according to gal80RGexp
  - Node fill color
  - Continuous mapping
- Go to Apps → jActiveModules.... The jActiveModules interface will appear as a tab in the Control Panel.
- Select gal80Rsig, Expand the **Advanced** panel, and run the algo with **Anneal** option. Notice that the **Number of Modules** is set to 5. This means that five putative hits will be returned, even if only one good one is found.



- When the results are ready, you will see 5 new subnetworks, as well as a network illustrating the search results.
- Explore the 2 subnetworks with the highest scores, and check their functions, for instance with the BINGO plugin