

Diseasome Biological Network

- Project Report by Vardhan Yadav

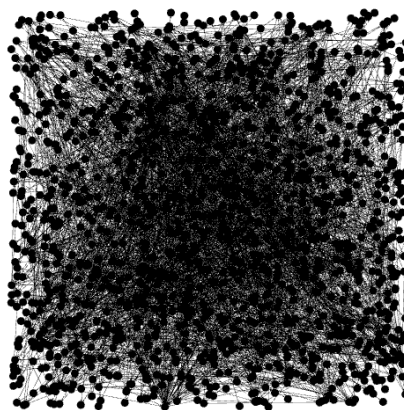
Background:

A network of disorders and disease genes linked by known disorder–gene associations, indicating the common genetic origin of many diseases. Genes associated with similar disorders show both higher likelihood of physical interactions between their products and higher expression profiling similarity for their transcripts, supporting the existence of distinct disease-specific functional modules.

Context ×

Nodes: 1419
Edges: 3926
Directed Graph

Initial Visualization:



Layout Alteration:

Force Atlas 2 is a popular layout algorithm used in Gephi, a software for network visualization and analysis. It's especially suited for visualizing large, complex networks. The algorithm positions nodes based on a force-directed approach, simulating physical forces like attraction and repulsion to reveal the network's structure in an intuitive way.

Layout ×

ForceAtlas 2

?

Stop

Threads

Threads number11

Performance

Tolerance (speed)1.0

Approximate Repulsion☒

Approximation1.2

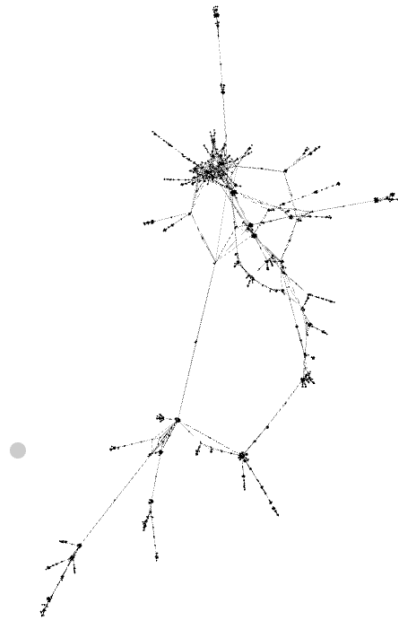
Tuning

Scaling2.0

Stronger Gravity☐

ForceAtlas 2 ?

☒ Presets... Reset



Basic Statistics:

Data Laboratory:

In Gephi, the Data Laboratory is a workspace that allows you to interact with your data in a tabular format, similar to how you would work with spreadsheets. It provides a user-friendly interface to view, edit, and manipulate your graph's node and edge data directly.

Gephi 0.10.1 - Untitled 1

Overview Data Laboratory Preview

diseasome

Data Table

Nodes Edges Configuration Add node Add edge Search/Replace Import Spreadsheet Export table More actions Filter: Id

Id	Label	Interval	type	disclass	Eccentri...	Closeness C...	Harmonic Closene...	Betweenness ...	Modul...	In-Deg...	Out-De...	Degree	Weighted I...	Weighted Ou...	Weighted...	Compo...	Strongly-Con...	Inferred...
220	220			Neurol...	10.0	0.197879	0.231512	100955.0	23	5	22	27	5.0	22.0	27.0	0	903	26
219	219			Neurol...	11.0	0.165384	0.184274	5662.0	23	1	6	7	1.0	6.0	7.0	0	903	26
270	270			Psychia...	11.0	0.165345	0.183803	4247.0	23	2	5	7	2.0	5.0	7.0	0	903	26
342	342			Hemat...	12.0	0.141914	0.152964	0.0	23	1	2	3	1.0	2.0	3.0	0	903	26
689	689			Neurol...	11.0	0.16523	0.182393	0.0	23	1	2	3	1.0	2.0	3.0	0	903	26
1524	1524			gene	12.0	0.141928	0.152787	0.0	23	1	0	1	1.0	0.0	1.0	0	108	26
1525	1525			gene	12.0	0.141928	0.152787	0.0	23	1	0	1	1.0	0.0	1.0	0	107	26
1526	1526			gene	12.0	0.141928	0.152787	0.0	23	1	0	1	1.0	0.0	1.0	0	106	26
1527	1527			gene	12.0	0.141928	0.152787	0.0	23	1	0	1	1.0	0.0	1.0	0	105	26
2182	2182			gene	11.0	0.165307	0.182863	0.0	23	2	0	2	2.0	0.0	2.0	0	109	26
2184	2184			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	122	26
2185	2185			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	121	26
2186	2186			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	120	26
2187	2187			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	119	26
2190	2190			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	118	26
2191	2191			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	117	26
2192	2192			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	116	26
2193	2193			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	115	26
2194	2194			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	114	26
2195	2195			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	113	26
2197	2197			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	111	26
2198	2198			gene	11.0	0.16521	0.18204	0.0	23	1	0	1	1.0	0.0	1.0	0	110	26
2335	2335			gene	10.0	0.195856	0.220557	0.0	23	2	0	2	2.0	0.0	2.0	0	112	26
3070	3070			gene	11.0	0.166139	0.185472	0.0	23	2	0	2	2.0	0.0	2.0	0	101	26

Add column Merge columns Delete column Clear column Copy data to other column Fill column with a value Duplicate column Create a boolean column from regex match Create column with list of regex matching groups Negate boolean values Convert column to dynamic

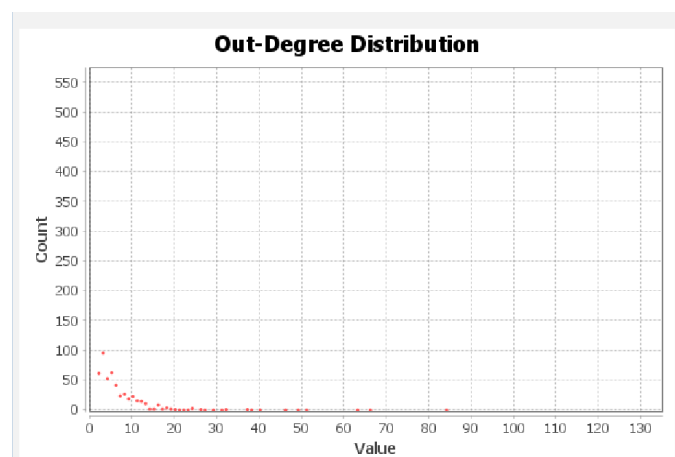
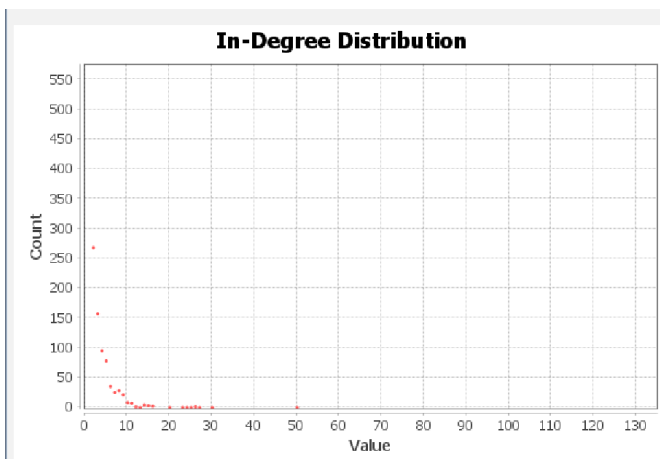
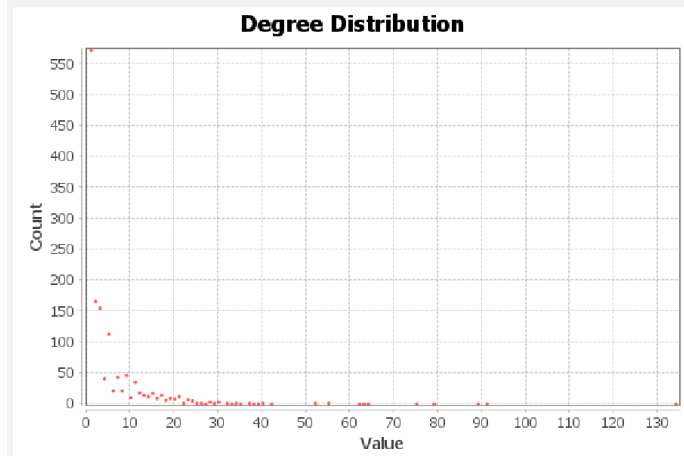
Force Atlas

Average Degree:

Average Degree is a network metric that represents the average number of connections (edges) each node has within the graph. It is a fundamental measure that gives an idea of how connected the nodes are on average.

Results:

Average Degree: 2.767



Network Diameter:

Network Diameter is a measure of the longest shortest path between any two nodes in a graph. It gives an indication of the "size" of the network in terms of how far apart nodes can be from one another.

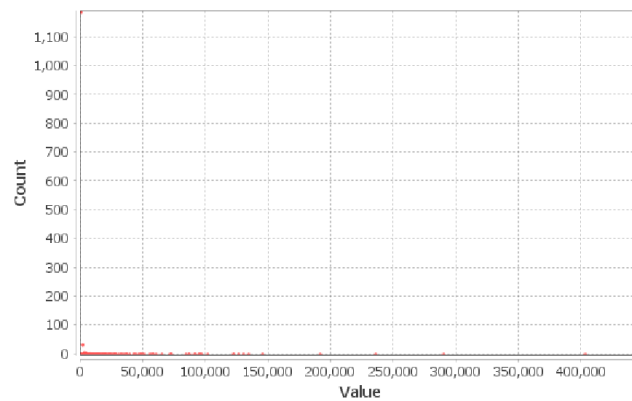
Results:

Diameter: 15

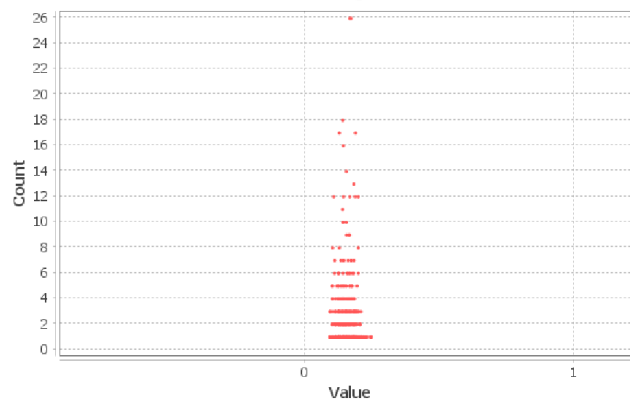
Radius: 8

Average Path length: 6.782579957080564

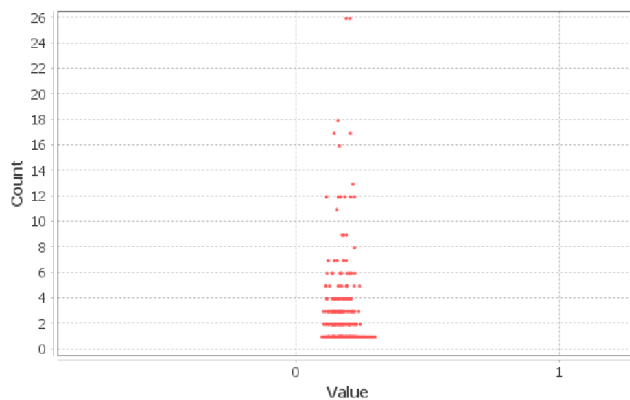
Betweenness Centrality Distribution

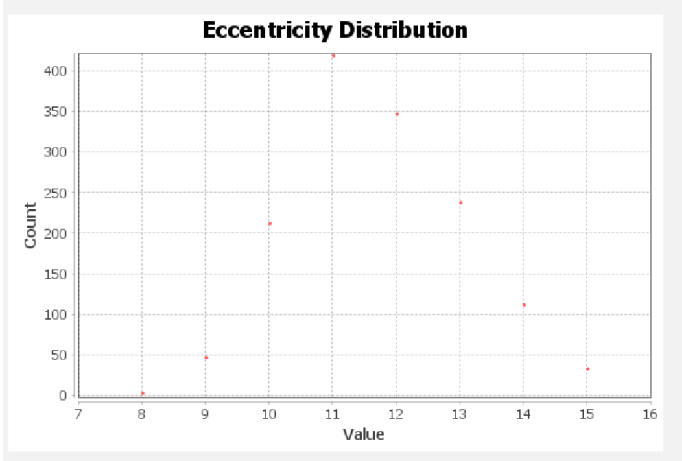


Closeness Centrality Distribution



Harmonic Closeness Centrality Distribution





Modularity Report:

Modularity Report provides information about the community structure within a network. Modularity is a measure that evaluates the strength of division of a network into modules or communities. These communities are groups of nodes that are more densely connected internally than with the rest of the network.

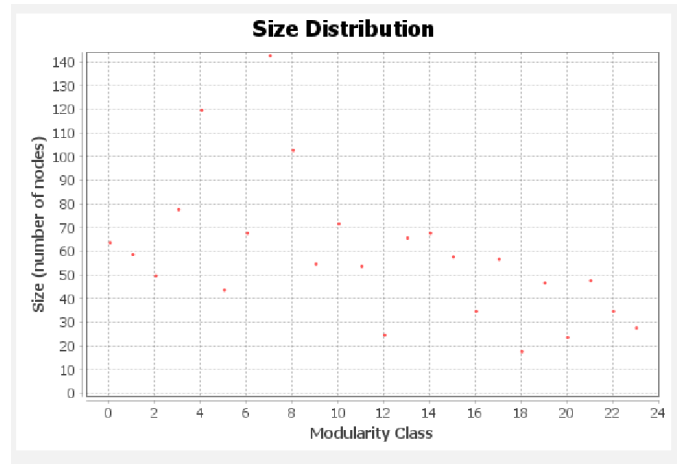
Modularity Report

Parameters:

Randomize: On
Use edge weights: On
Resolution: 1.0

Results:

Modularity: 0.868
Modularity with resolution: 0.868
Number of Communities: 24



Appearance Settings:

Based on Nodes:

Appearance settings allow you to customize how nodes (and edges) are visually represented in your graph. These settings help you highlight key patterns and insights by adjusting node size, color, labels, and more based on different attributes.

Appearance Settings Based on Nodes:

1. Node Color:

You can color nodes based on:

- Partition: Assigns colors based on categorical data (e.g., communities, types, categories). Each distinct value is assigned a different color.
- Ranking: Colors nodes based on a numerical or ordinal attribute (e.g., degree, betweenness centrality). You can set a gradient or spectrum to represent different ranges of values.
- Attribute Values: Directly map colors to specific attribute values in your dataset.

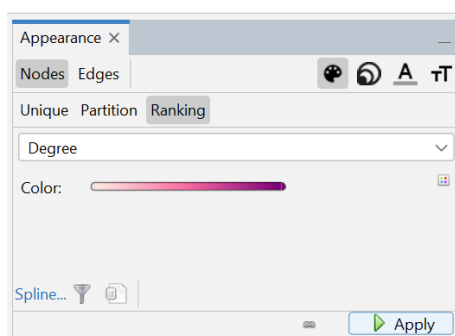
2. Node Size:

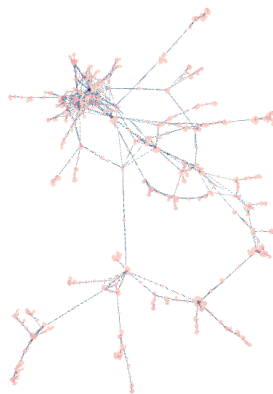
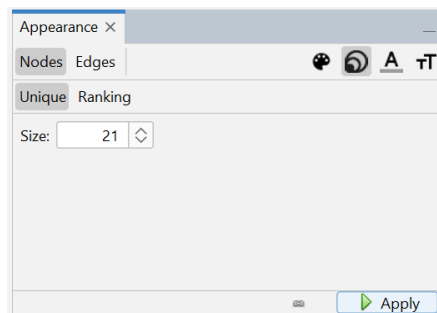
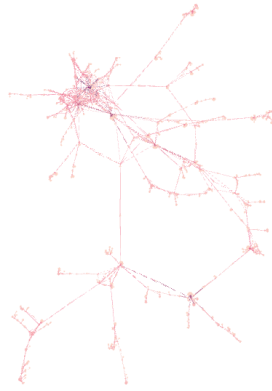
You can scale the size of nodes based on:

- Ranking: Adjusts node size according to a numeric attribute like degree, centrality, or other metrics. Larger values result in larger node sizes, helping to visually highlight more important or connected nodes.
- Fixed Size: Assign all nodes the same size, useful when you want uniformity in node representation.

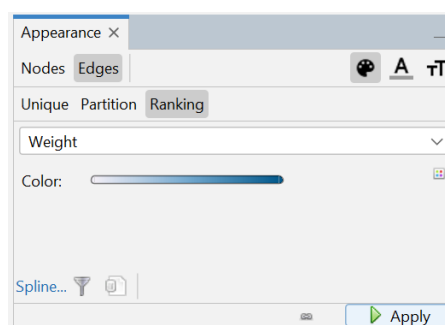
3. Node Label:

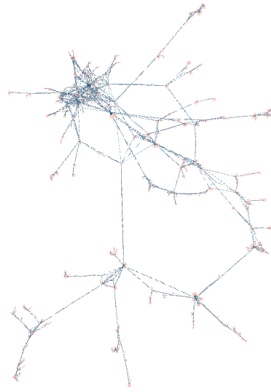
- Label Visibility: Toggle node labels on or off.
- Label Size: You can set label sizes to scale based on attributes (e.g., a node with a higher degree could have a larger label).
- Label Content: Choose what information is displayed as a label, such as a node's name, ID, or any other attribute.
- Label Color: Adjust label colors either uniformly or based on node colors.





Based on Edges:





Use cases of Topologies:

Degree Range

The Degree Range option under the Topology tab in Gephi is a tool used to filter and visualize nodes based on their degree (the number of connections each node has). It allows you to select and view nodes within a specified range of degrees, helping you focus on nodes with particular levels of connectivity.

