

ClusteringCoefficient

The clustering coefficient is a metric that seeks to describe the amount of clustering in a graph. Clustering is when a subset of vertices have lots of edges to each other.

Apparently first sighted in the famous paper about small world networks published in Nature: http://tam.cornell.edu/SS_nature_smallworld.pdf [1]

The definition is very loose in the small world paper though.

'Scaling exponents and clustering coefficients of a growing random network' (<http://arxiv.org/abs/cond-mat/0303547> [2]) gives some more precise definitions. essay format | essay writing help plus size clothing candy gift baskets

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Clustering coefficient for undirected graphs, with no reflexive edges:

Define the clustering coefficient for a vertex v in the following way:

Let N (the neighbour set) be the set of vertices that are connected to v , ie. that share an edge with v (not including v). The maximum number of edges among the set N is $|N|*(|N|-1)/2$.

Then define the clustering coefficient for a vertex v , given that $|N| \geq 2$, as the actual number of edges among N divided by $|N|*(|N|-1)/2$.

The clustering coefficient for the graph is the average clustering coefficient of the vertices, in this definition computed over all vertices with associated $|N| \geq 2$.

Where "N" is the name product of the integers.

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The clustering coefficient of a totally random network (from [2]) is $= \langle k \rangle / N$, where $\langle k \rangle$ is the average degree of the vertices, and N is the number of vertices. Higher clustering coefficients will be found in networks with greater 'clumpiness'. (This comparison is actually a bit dodgy because the clustering coefficient definition weight loss pills I am using is computed only over nodes with degree ≥ 2)

A 'small world' network is one in which the clustering coefficient is high, indicating the network has mostly 'local' edges, but which has a low characteristic path length, ie whey protein powders. a low average shortest path between two vertices. closet doors revitol cellulite cream reviews

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Results

Class call graph results

In this case, the call graphs are treated as undirected, with an edge between two classes if at least one of the classes calls a method on the other class.

Java v1.1 runtime class library

contained 2031 classes with at least one method call two another class. buy silver coins

```
clustering coefficient: 0.400374
total num edges: 17732
average node degree: 8.73067
<k>/N: 0.00429871
```

<k>/N is the clustering coefficient expected if the network was totally random. The actual clustering coefficient is 3 orders of magnitude higher, indicating a high degree of clustering moving quotes.

Azureus Callgraph

```
1386 classes
average clustering coefficient: 0.263343
total num edges: 10232
average degree: 7.3824
<k>/N: 0.0053264
```

Method call graph results

In this case, methods are the nodes in the graph, and there is an (undirected) edge between two nodes if one of the methods calls the other method. Methods are 'fully qualified' with the containing class name, i.e. Applet.doSomething() is a different method/node from Widget.doSomething().

```
Java v1.1 runtime class library 12838 nodes
average clustering coefficient: 0.106641
total num edges: 69156
average degree: 5.38682
<k>/N (expected clustering coeff): 0.0004196
```

```
Azureus 7161 nodes
average clustering coefficient: 0.0835065
total num edges: 40204
average degree: 5.6143
<k>/N (expected clustering coeff): 0.000784011
```

The clustering coefficient is lower for method call graphs and copper farmhouse sink, as opposed to class call graphs, due to methods containing less code and being operated on less often than classes. Again, the clustering coefficients are much greater than <k>/N, indicating a lot of clustering in the graphs. "N" stands for naming your business
