The method stems from percolation in graph theory, where one can estimate the expected size of the largest connected component given a graph and *k* randomly selected nodes. For some kcrit number of nodes, most of them are in the largest connected component. Thus, if the first k nodes (k << kcrit) form a largest connected component larger than expected by random, their connections are non-random, and they form a functionally related core. The method works as follows and is implemented in the BiNOM cytoscape plugin. First, *k* top-ranked DEGs are mapped into the Human Protein Reference Database (HPRD). Assume *k’* (k’ <= k) DEGs are found in the interaction graph. The size of the largest connected component (LCC) formed by these *k’* genes is denoted C(k’). Then, *k’* genes are randomly sampled from the HPRD, preserving the connectivity distribution of the *k’* ranked DEGs, and the size of the LCC, R(k’) is recorded. This is repeated 10,000 times and the mean size of the LCCs () is calculated. The percolation score, S, is computed for *k’*:

This process is repeated for values of k from 100 to 900 in increments of 50. The optimal k (kopt) is chosen as the smallest k such that S decreases as k increases for k > kopt.

Identification of the set of functionally related differentially expressed genes (FunDEGs) works as follows: for some number of differentially expressed genes, , most of the genes are part of the largest connected component. Thus, if the first top ranked DEGs () form a connected component larger than expected by random, they form a tightly connected functional group. These first DEGs are used to construct the network. To determine the optimal , we tested values from 100 to 900 in increments of 50 using the Cytoscape plugin BiNOM with the Human Protein Reference Database (HPRD) [SOURCES]. BiNOM identifies the largest connected component (LCC) formed by the interactions of the first DEGs in the HPRD, and scores the size of the LCC in comparison to the expectation from random interactions of genes. The smallest value of that produced a connected component larger than expected by random was chosen for network construction