Innovative methods for visualization of multidimensional omics data

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Analyses of data constituting multiple sample points collected across different experiments as well as comparison of multiple interaction networks play key roles in deciphering meaningful knowledge from multidimensional data. In biological sciences, such 'omics' data include expression values of several genes/proteins across multiple samples (from microarray experiments), abundances of multiple taxonomic groups in various samples (from metagenomics studies), etc. Similarly, examples of interaction networks include protein-protein interaction, microbial association, metabolic networks, etc. Understanding the behavior of individual components of a system (i.e. interactions amongst them) becomes easy for researchers when the analysis is aided by efficient visual data mining platforms.

In this communication, we present two easy to use visual data mining tools, namely 'Igloo-Plot' [1] and 'CompNet' [2]. Igloo-Plot enables one to visualize/ plot, and subsequently analyze, multidimensional data on a 2D semi-circular canvas using a 'feature decomposition independent technique'. CompNet, on the other hand, enables visualization/ overlay and analysis of graph data pertaining to multiple interaction networks on the same canvas. Igloo-Plot and CompNet have been implemented as user friendly tools, which in addition to innovative visualization, allow a multitude of other intuitive and interactive features (Figure 1). We showcase the utility of both these tools using video demonstrations (available at http://121.241.184.233/video_demos/Demonstration_videos.zip).

References :

1. Kuntal BK, Ghosh TS, Mande SS. Igloo-Plot: a tool for visualization of multidimensional datasets. Genomics. 2014 Jan;103(1):11-20.
2. Kuntal BK, Dutta A, Mande SS. CompNet: a GUI based tool for comparison of multiple biological interaction networks. BMC Bioinformatics. 2016 Apr 26;17(1):185.