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BioAnalyzer: A tool for RNA local secondary structure prediction and visualization

RNA local secondary structures (LSSs) can act as RNA motifs, which are involved in various biological functions such as gene regulation and gene replication. Thus, prediction of these RNA LSSs may help understand their biological functions. Our group recently developed a new algorithm and an associated software package called Rnall for RNA LSS prediction. However, Rnall was not designed for visualization, and it was developed only on Linux/Unix platforms, which may generate much inconvenience to many users in the biological community who are more comfortable working with other operating systems (e.g. Windows) than Linux/Unix. To overcome these inconveniences, BioAnalyzer was developed as a platform-independent Graphical User Interface (GUI) for RNA LSS prediction and visualization. We implemented BioAnalyzer in Java to achieve the desired level of platform-independence. BioAnalyzer predicts and visualizes Rnall LSSs by scanning the genomes, sending user-selected sequence windows to Rnall for structure prediction, sending Rnall output to Naview (a RNA secondary structure visualization tool), and then displaying Naview output in jpg format. Intermediary steps are shown, such as displaying the scanned gene names, functions, and other features as well as their associated structures from Rnall, and the picture generated by Naview. All this functionality is combined in a single GUI for easy access to any parts of the data flows and quick retesting. We have succeeded in applying BioAnalyzer in the prediction of RNA LSSs in *Mycoplasma genitalium* and *Escherchia coli* K-12 on Linux, Windows, and Mac OS X. In the near future, by integrating the high throughput data resources, BioAnalyzer will be able to associate the gene expression data, such as microarray and proteomics, with the RNA LSSs. With these biological data, BioAnalyzer may be a tool for future specific RNA motif (e.g. Riboswitch, intrinsic terminator, and RNAi) prediction beyond RNA LSS prediction.