

## **Studying cancer biology big data with Google Maps: NaviCell Web Service and Atlas of Cancer Signaling Network**

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Computer-based technologies in geography allow navigating and comprehending large amounts of complex data. By analogy, it is tempting to chart a global map of molecular biology representing all available knowledge of known molecular mechanisms in a cell, and use it for visualizing and reasoning on the big biological data at different scales. We present a set of systems biology resources, including NaviCell Web Service and Atlas of Cancer Signaling Network (ACSN), which implements this task for the field of cancer biology. ACSN is a map of cancer biology browsable using Google Maps technology, organised in a form of “geography-like” map having a meaningful and insightful layout. It contains detailed description of the mechanisms implicated in cancer including DNA repair, Cell Survival, Apoptosis, Cell Cycle, EMT and Cell Motility together with their connections and cross-regulations. NaviCell Web Service is a tool for network-based visualization of “omics” data which implements several innovative data visual representation methods and tools for combining them together, using geographical map metaphor. All functions of NaviCell can be manipulated in several programming languages including Python and R: therefore, the tool can serve as an online front-end for many existing data analysis pipelines. We show various possibilities of visualization of different types of cancer-related data starting from simple gene lists to visualizations of whole transcriptomes or phosphoproteomic data. Data abstraction together with network abstraction methods used in this approach helps to smoothly zoom out and zoom into the details of molecular mechanisms involved in a specific cancer type or in a tumoral sample.