Abstract

The complete set of neurons and their synaptic connectivity in the worm Caenorhabditis elegans has been worked out experimentally. These neurons, with their chemical and electrical synapses, form a network through which informational cues are transferred for the worm to generate appropriate behavioral responses. Thus, the C. elegans neuronal connectivity presents itself as an ideal system to understand if/how connectivity pattern can explain different behaviors observed in a worm. I have used the network theory to analyze the neuronal connectivity pattern in C. elegans, and looked for functional correlations. Here, first I have experimentally analyzed the role of EXP-1 protein in AWC neuron mediated chemotaxis behavior, using chemotaxis assay. Then, I have analyzed both undirected and directed neuronal networks based on types of synaptic connections, and compared their properties to the ones reported in literature. Using modularity and shortest path analysis, I have shown how connectivity pattern underlies the chemotaxis behavior in worms, and propose alternate neuronal circuits for navigation in C. elegans.