

Modularity-density based edge betweenness for catchment classification in a large region

ABSTRACT

In the studies of catchment classification, the concept of community structure, within the realm of complex networks, is particularly attractive and gaining attention. Among the many community structure methods, the edge betweenness (EB) method, which applies a hierarchical clustering concept, is one of the most widely used. The EB method, however, is susceptible to the issue of scale (or size) of the network, essentially due to the modularity function that is used to measure the strength of the community structure. To overcome this limitation, the present study proposes an improvement to the EB method. The proposed method, termed as the Modularity Density-based Edge Betweenness (MDEB) method, uses a modularity density function (or D value) by maximization, to obtain the best split of the network. The effectiveness of the MDEB method is evaluated through its application for catchment classification using 218 streamflow stations in Australia. From the network, three different scenarios in network sizes are studied. The superiority of the MDEB method is evaluated in terms of the number of communities identified communities when different network sizes are considered.