Abstract

Akin to most infrastructures, intraurban bus networks are large and highly complex. Understanding the composition of such networks requires an intricate decomposition of the network into modules, taking into account the manner in which network links are distributed among the nodes. There exists for each set of highly interlinked nodes little connectivity with the next set of highly interlinked nodes. This inherent property of nodes makes community detection a popular approach for analyzing the structure of complex networks. In this study, we attempt to understand the structure of the intraurban bus network of Ireland's capital city, Dublin in a two-step approach. We first analyze the modular structure of the network by identifying potential communities. Secondly, we assess the prominence of each network node by examining the module-based topological properties of the nodes. Results of this empirical study reveal a clear pattern of independent communities, indicating thus, an implicit multi-community structure of the intraurban bus network. Examination of the geographic characteristics of the identified communities shows a degree of socio-economic divisions of the Dublin city. Furthermore, a large majority of the important nodes (vital transportation hubs) are located at the city center, implying that most of the bus lines in Dublin city tend to intersect the city's core.