

3.3.2

Identification of Regional Subcenters Using Spatial Data Analysis for Estimating Traffic Volume

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In short-term traffic volume prediction, it is important to consider a roadway's function in the system, the local land use pattern, and the spatial patterns of land use including population and employment distribution in the larger urban area. Intuitively, the location of a roadway segment in relation to those of significant activity centers such as a central business district (CBD) or population centers influences the traffic volume on the roadway segment. For instance, a roadway that is between a population center and a CBD is likely to have a larger traffic volume than one that is far from both. However, such a relationship remains to be verified and quantified. One difficulty is to determine urban activity centers including population and employment centers. Different from a typical downtown area, such activity centers usually do not have a clear boundary or distinguish themselves with an unusually high density.

To investigate the spatial patterns of employment and population "subcenters" and their impact on traffic, an approach based on spatial autocorrelation is proposed to define regional population and employment subcenters. The procedure can be applied to either TAZ or census level data and does not require detailed knowledge of the study area. These subcenters are subsequently used to calculate regional accessibility indices, which can be related to traffic volume on a road through regression models. Model results have shown that regional accessibility measures developed based on such subcenters have a higher explanatory power than those that based on traffic analysis zones.