

Spatial-temporal Analysis of Human Mobility in Manila Metropolitan Area

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The metropolitan area can be regarded as a multi-functional structure consisting of plural coordinated urban nucleuses. Commuting and consuming activities, which occur for most outdoor travel purposes of human daily activities, are two principal reflected forms of human mobility. This study aims to clarify the characteristics of urban nucleuses and spatial-temporal pattern of human mobility in the Manila metropolitan area. Hourly density of human mobility from 00:00 to 24:00 in the whole study area is quantitatively studied. The main findings are summarized as follows. 1) Urban nucleuses with city center type like Manila, Quezon, Makati and Las Piñas, attract more males, young people and mental workers. More commuting or consuming activities and more mobility by public transit occur there. Inflow trips are mostly dominant at 08:00-12:00 and outflow trips at 16:00-20:00. 2) Business city like Taytay, attracts more working activities. Inflow trips mostly occur at 12:00-16:00 and outflow trips occur at 16:00-24:00, whose peak-time is later than city center type. 3) More returning-home activities and more mobility by walking or car happen in commuter towns like Biñan. Inflow trips mostly occur at 16:00-24:00, while outflow trips occur before 08:00. This shows temporal symmetry compared with urban nucleuses with city center type. 4) In suburban centers like Naic and Guiguinto, inflow and outflow trips mostly occur before 08:00, whose peak-time is earlier than city center type. Relatively more females, middle or old age people, manual workers or no-occupation people move their trips into these areas. 5) Subcenter cities including Cavite and San Jose del Monte, have similar characteristics with CBD cities, but these cities have a high rate of consuming activities and more female movements. This study provides a practical mining method of traffic big data. Moreover, spatial-temporal analysis of human mobility also possesses a meaningful academic value for transport geography.

Keywords: human mobility, Manila metropolitan area, pattern recognition, spatial-temporal analysis, urban nucleuses