

Research of pedestrian flow observation method using Wi-Fi packet sensor

(Study period: FY 2018–)

NAKANISHI Kenya, Head; YOSHIDA Jundo, Senior Researcher
Urban Planning Department , Urban Facilities Division

(Keywords) Pedestrian flow rate, pedestrian flow, pedestrian movement observation, Wi-Fi, central area of a city

1. Introduction

To create comfortable spaces in the central areas of cities so that people will feel like walking, the spatial structure of roads and roadside facilities is reevaluated, and the utilization of urban facilities is being examined with the cooperation of organizations and groups related to roadside spaces. When conducting these activities, it becomes important to propose plans based on data, such as traffic volume and the conditions of flow and to evaluate the outcomes of conducting the activities. New methods that use data from mobile phone base stations, data from images captured by mobile phone cameras, and GPS data have attracted attention over the past few years as methods of observing pedestrian movement. This study focuses on Wi-Fi packet sensors that can relatively easily obtain data at low cost and verifies the usability of such sensors.

2. Outline of Wi-Fi packet sensor

Terminal devices, such as mobile phones with Wi-Fi functions, emit radio waves (probe request) to connect to routers etc. The probe request contains information, such as the ID of the terminal device. Sensors can identify the movement of pedestrians carrying the device by obtaining this information.

3. Application of Wi-Fi packet sensor

In this study, sensors were used in the central part of Kawagoe City, an area crowded with tourists, and pedestrian movement was identified. The flow of pedestrians moving around various areas can be identified by using ID information obtained from sensors. Figure 1 shows one of the examples. At the same time, the number of people remaining within a section divided by two sensors can also be identified. The data of people remaining within an area are compared with the data of actually measured values by conducting manual traffic

counting by actual persons. As a result, the study found a certain correlation between the two, although some differences were seen depending on the locations of the observation.

Meanwhile, the study found large differences in the magnification ratio (ratio compared to actually measured values) depending on the location and time zone. (Figure 2) A possible cause was that the sensor installation environment may have affected the outcome.

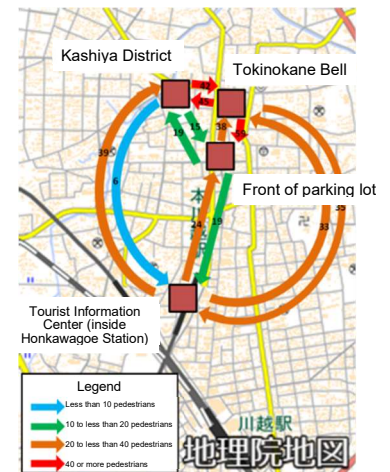


Figure 1: Movement status

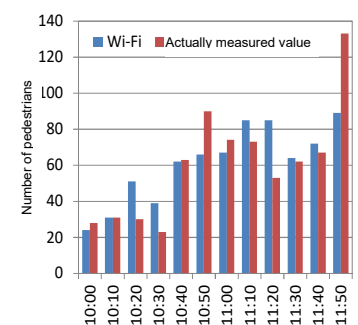


Figure 2: Comparison with actually measured values

4. Future studies

One of the great characteristics of Wi-Fi packet sensors is that they can identify pedestrian flows in underground spaces and inside buildings. Cities have many facilities, such as underground passages, that pedestrians use. Thus, Wi-Fi sensors are expected to be usable in many locations. Future observations will include ones in underground passages to focus on identifying the unique characteristics of underground spaces.