

Study of new technology to survey pedestrian spaces

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1. Introduction

The flow of pedestrians is becoming significantly complicated in pedestrian spaces in recent years because of the mixture of various types of pedestrians (e.g. commuters, shoppers, and tourists) as the functions of nearby facilities are becoming combined, in addition to the increased size and diversity of the belongings of pedestrians (e.g. suitcases and baby carts). Under such circumstances, administrations are often required to improve the pedestrian environment in central parts of cities and tourist spots as the number of non-Japanese tourists increases.

The improvement of the pedestrian environment requires the identification of complicated pedestrian flows. The required data include the types of pedestrians at many fixed points within the target areas, walking speed, and walking routes within the target areas. A mainstream method to obtain these data used to be the allocation of survey staff in observation ranges to visually check pedestrians. Yet, the data acquisition method using image analysis has been established in recent years. This paper introduces the effectiveness of the current image analysis technologies.

2. Comparison between visual surveying and image analysis

The figure below shows the comparison between pedestrian traffic volumes measured through visual counting surveys and volumes estimated using image analysis technologies at Shinjuku Dori near Shinjuku Station during the daytime of a cloudy day.

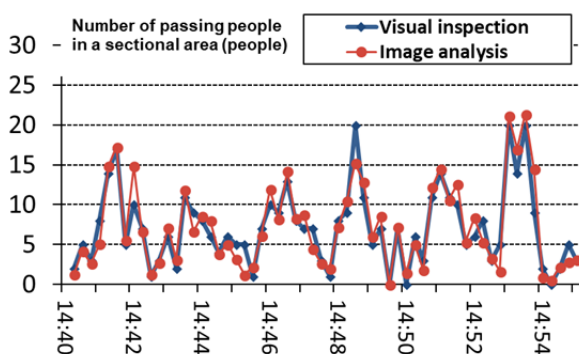


Figure: Comparison between visual survey and image analysis

The ratio of the sum of the volume estimated by the image analysis during the survey period was 101% of the

volume measured through visual inspections indicating that the volumes were about the same in both methods.

3. Precautions for using the image analysis technology

The environments around pedestrian spaces where actual surveys are conducted are diverse. The result of the comparison discussed in the last chapter is an example under the environment that is relatively suitable for surveying with image analysis. It must be noted that the precision may decrease under certain survey conditions. The table below summarizes the characteristics of visual surveys and image analyses, including the effects of survey conditions on the outcomes of surveys.

The selection of suitable survey methods and complementation among different survey methods are required based on these characteristics.

Table: Characteristics of image analysis and visual survey

		Investigation method	
		Visual inspection	Image analysis
Effects of survey conditions	Pedestrian density	- Errors tend to increase when many pedestrians overlap with each other depending on the angle of image capture. G6	- Errors tend to increase when many pedestrians overlap with each other depending on the angle of image capture.
	Belongings and clothes of pedestrians	- No serious effect	- The precision tends to lower when many pedestrians put up their umbrellas. - Failure to recognize pedestrians may occur when they are wearing masks or hats.
	Optical environment	- No serious effect	- The precision tends to lower in the morning and late afternoon when the sun angle is low.
	Road conditions	- No serious effect	- The precision may lower when pedestrians and vehicles are not clearly separated.
Other characteristics	Privacy	- No major problem because no personal information is used.	- Notification about the survey is required. - Images need to be immediately deleted after acquiring traffic volume data (after the analysis).
	Continuity of data acquisition	- Data can be acquired only while survey staff are present.	- Data can be acquired for a long time.

☞ For more detailed information

1) The 37th Presentations of the Japan Society of Traffic Engineers No. 72, pp.459-465