A Study of Visualization Analysis Method in Crowd Flow Spatial Survey

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Abstract: Objective: This study tries to use visualization of crowd of spatial statistical methods, explore Taipei MRT transit crowd of the effectiveness space Background: Taipei metro transit transport system to the crowd as the main body which is a busy circulation ride space load lot of environmental carrying capacity. It not only reflects pace of life in the convenience city, but represents the city symbol of civilization which included the urban efficiency, safety indicators, the degree of happiness, and humanity cultural exchange, but the worse is that it hidden potentially dangerous, like high density crowded, spread of infectious diseases, fire, natural disasters and even terrorist attacks [1,2,5,9], therefore if the effective understanding of travelers dynamic, which can significantly reduce the space of potential danger[10,11].

Figure 1, The code of camera area. Data: First-hand Data by more than one thousand video records, including peak, off-peak and minor peak hours times of the crowd spatial data. The camera coding of databases dividing to different parts in the floor layout is basis on the single camera image. The single lens code means the single camera image in real space area (Figure 1). The databases indicated by points mean the investigators’ stagnation location. The length and direction of lines in database mean camera shooting direction and the depth. The investigators needed to be table into the correct survey form after counted the number of people in the videos. Including date, time, camera code, period of time, distance, normal people, disabilities, normal people stay, disabilities stay, body type, 0~1min directional flow, 1~2min directional flow, 2~3min directional flow, spatial density. Methodology: There are four theories in this study that are the environmental behavior theory, spatial statistical analysis and spatial information technology. Survey Design is research environmental behavior survey method. Environmental behavior is based on behavioral observation and through experimental design survey methodology to derive [3,4,7]. Spatial statistical analysis is based on crowd of space statistical theory [6,8,13]. Spatial information technology compared with the data collection and derived the calculation operation modes of work platforms, including overlay, internet, and temporal sequence [12]. There are eight directional flows summarizes in peak and off-peak. From camera code 9~48, 56, 60~62etc, there are crowd gathered at specific area. Especially camera code 47, there are about 550 passengers in peak. Camera code 47 is intersection at Taiwan Railways, Taiwan High Speed Rail, Taipei Bus Station, and also close to each of MRT gates. It is a large buffer zone which passed numerous passengers. In contrast to camera code 47 this area, there are many camera code areas less than 2 passengers even none. This represents a difference and particularity of the distribution of the crowd flow (Figure 2). Result and Discussion: The process is first, the preliminary environmental behavior survey records were finished by theoretical derivation and the complex survey design procedure. Secondary, the survey records converted into
excel tables, and then Spatial Statistics collection. Third, through the method of various visual performance to organize a variety of reasonable crowd assess analysis method, including spatial and temporal distribution factor, effectiveness space, the overall space, each of the categories of space, space conversion, density, direction of flow, etc, then derived the possible calculation formula. At last, integrate final conclusions. Conclusion and Future Work: Through the construction of assess analysis method and calculation formula, and visual dynamic simulation combination try to propose the effectiveness space of assessing. To explored the preliminary of the potential risk of a spatial and temporal distribution, as the next stage of research applications subway transfer station performance assessment. This study through digital video survey converts into survey table database and database integration analysis. A detailed survey results not merely shows the crowd flow variability, but understanding Taipei metro transit transport system pace of life as usual cycle of work and rest rule. It expressed the effectiveness and practicality in digital video survey. Through time and space simulation, there are more than one thousand video records, including peak, off-peak and minor peak hours times of the crowd spatial data be presented. In any kind of special features, including the whole transit space, each category space, long ribbon space, the large space, the small space, the escalators and the stairs. Added crowd dynamics spatial statistics, cross-analysis of temporal and spatial simulation, and then correlation factor for the permutations and combinations, compile a dynamic flow of time and space distributions generally. Future research is mainly to the Taipei metro transit transport system comprehensive digital imaging survey, and tries to overcome the human deletions, including subjective judgment standard of investigators, investigators live digital survey method, the table filling orders computing design flaws, and so on. There are still so much to find the problems, as the next stage of research applications subway transfer station performance assessment.