# Spatial analysis of children's commuting space - a case study of Toyama city elementary school -

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Social attention to the safety and security of children has become high since the 1990s. Children use the outdoor space to move between school and home. Watching activities and urban maintenance have been done to protect children from crimes and traffic accidents. It is necessary to grasp the outdoor activities of children for these effective efforts. Currently, the progress of information and communication technology (ITC) makes it possible to research using child's location information with GNSS. In Toyama City, LPWA network covers 98% of the residential area as a Smart City infrastructure building project. So we used the location information from the LoRaWAN position information. This research was conducted in two school districts, Shibazono Elementary School District and the Hayahoshi Elementary School District. GPS position information (latitude / longitude) is transmitted at 1 minute intervals from the position information acquisition sensor device. The implementation period was from January 21 to February 15, 2019, 267 participants in Shibazono elementary school district and 550 participants in Hayahoshi elementary school district. Analysis was done from the viewpoint of distribution and density. As a result, it was found that a high-density point distribution can be seen along the set school road, and it was found that the school-established school road is prominently used. However, cases where unexpected small diameters are also used at high density from routes of movement to school childcare such as on routes not designated by the school were also collected. Also, the number of children going to school and returning to home is the same, but there was a big difference in density. It is due to the diversity of movement of children by afterschool activities. Looking at the point distribution by time, the time of passing through the danger points became clear. These information is effective for the local community. The differences in grade, the distribution has spread the lower grade than higher grade. It is due to autonomous movement and going out after returning home in higher grade, while lower grades move to various places depending on the guardian's car movement.

Keywords: elementary school children, commuting, position information, ICT

 