Proposal for method to identify high-risk areas in community roads using ETC 2.0 probe information

(Research period: FY 2016–2018)

Hiroshi Kobayashi ,Head(Dr.Eng.), Yuta Ozaki, Senior Researcher   Haruka Kawase,

Researcher   Yuta Kawamatsu, Guest Research Engineer

Road Safety Division, Road Traffic Department

(Keywords) ETC 2.0, traffic safety measures, community road

1. Introduction

An important factor in the effective and efficient implementation of traffic safety measures is to find areas with frequent accidents or high-risk traffic accident areas and implement focused measures in such areas.

The NILIM is exploring methods to extract high-risk traffic accident areas on community roads based on the actual onset of accidents and data on sudden braking and through-traffic obtained as ETC 2.0 probe information.

2. Method to aggregate data to extract high-risk areas

Accidents on arterial roads tend to occur in specific areas. On the other hand, the locations of traffic accidents on community roads tend to be widespread. Also, it is effective to implement focused traffic safety measures on community roads in areas surrounded by arterial roads. Based on the above, an accident risk evaluation to extract target areas needs to be conducted by taking into account the spread of high-risk areas. In addition, big data, such as ETC 2.0 probe information, should be handled using simple methods.

One way is a method to aggregate and evaluate 500-meter mesh data. Yet, it is associated with the disadvantage that the result changes depending on the methods to divide the mesh.

Therefore, this study examines a method to evaluate the risks of accidents by taking into consideration their spatial distribution using a kernel density estimation, which is one of the methods to estimate the spatial distribution of density across all data using limited volumes of data. Kernel density estimations estimate the density of data at individual spots by setting the same function (kernel function) for each data set and using the function that combines all the functions (Fig. 1).

Figure 2 shows the distribution of sudden braking obtained as ETC 2.0 probe information and the result of the kernel density estimation of sudden braking data. The use of this method is expected allow the visual observation of the spread of the density of sudden braking and enable the risk evaluation of accidents by taking into account their distribution.

3. Future studies

Future studies will aim to establish methods to identify high-risk areas on community roads by combining the results of examining data aggregation methods introduced in this paper with the result of examining indexes to evaluate the risk of accidents.
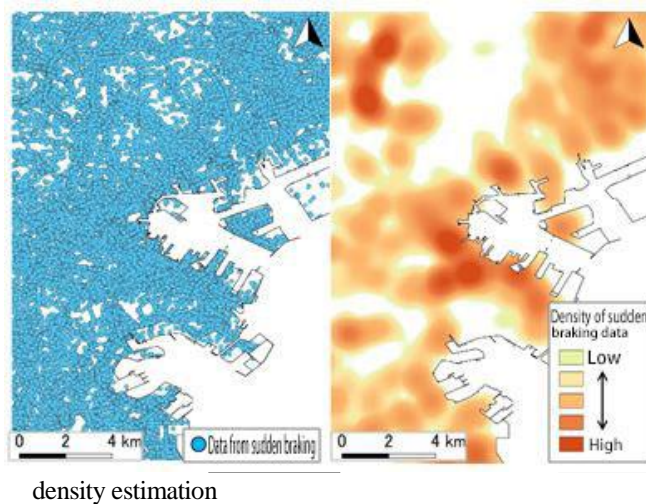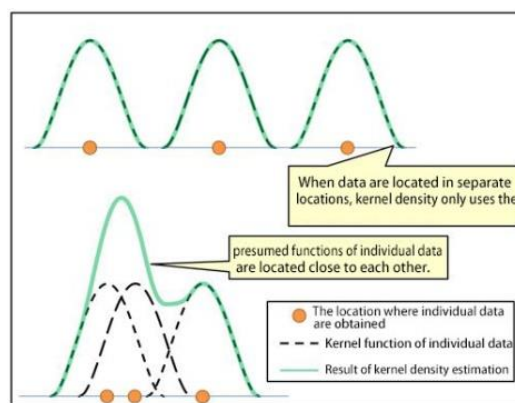

Figure 1 Kernel density estimation

density estimation

Figure 2 Result of a kernel density estimation of sudden braking data