

Educational Programs for Traffic Safety: Analysis of Traits and Behavior of Traffic Offenders

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The number of traffic accidents in Japan has declined in recent years but remains high, and human factors—typically manifested as legal violations—are involved in many of them. Traffic safety education is an important countermeasure against such human factors. However, even when the same unsafe driving behavior is observed, the underlying behavior-related factors (e.g., driving skill, knowledge, awareness, or self-recognition) can differ among drivers. Existing traffic safety education is generally provided uniformly, regardless of such behavior-related factors, and its effectiveness has been reported to be limited. Prior attempts to individualize education have used information such as driving behavior or driver attributes, but they do not take behavior-related factors into account.

This study therefore proposes a traffic safety education program that uses the GDE matrix to organize behavior-related factors and extracts candidate education domains by combining driving behavior features, a knowledge test, driver trait information, and self-evaluation results (Fig. 1). Starting from an evaluation based on driving behavior features, candidate education domains are extracted from three viewpoints—knowledge and skill, risk-increasing factors, and self-evaluation. When multiple domains are extracted, higher-level domains are prioritized, while multiple viewpoints within the same level are all treated as targets for education. Based on the extracted domains, the program presents the evaluation results to the driver together with the direction for improvement, and selects the corresponding education content. For example, when a domain related to knowledge and skill is extracted, the program presents an evaluation of the corresponding behavior and directions for improvement, together with practice of the relevant driving operations. When a domain related to self-evaluation is extracted, driving footage and behavior features are presented to help the driver recognize discrepancies between their actual behavior and their own assessment. When a domain related to risk-increasing factors is extracted, hazard-perception training and driving behavior data are used to encourage awareness of driving risk.

To support the implementation of the proposed program, a preliminary analysis was conducted using data from traffic violators, focusing on driving behavior at a stop-sign-controlled intersection. The analysis examined the relationship between driving behavior features and driver trait information, as well as the consistency between behavior-based evaluations and self-evaluations.

The results showed partial correlations between some driving behavior features and driver trait information, as well as significant differences in driver trait information between the safe and unsafe groups classified by behavior-based evaluation. The agreement rate between behavior-based evaluations and self-evaluations was only 39%, and 57% of drivers whose behavior was evaluated as unsafe nonetheless rated their own driving as appropriate. These results provide basic support for the validity of the proposed education program.

Future work will extend the range of traffic scenarios considered and apply the proposed program to actual education settings to verify its effectiveness.

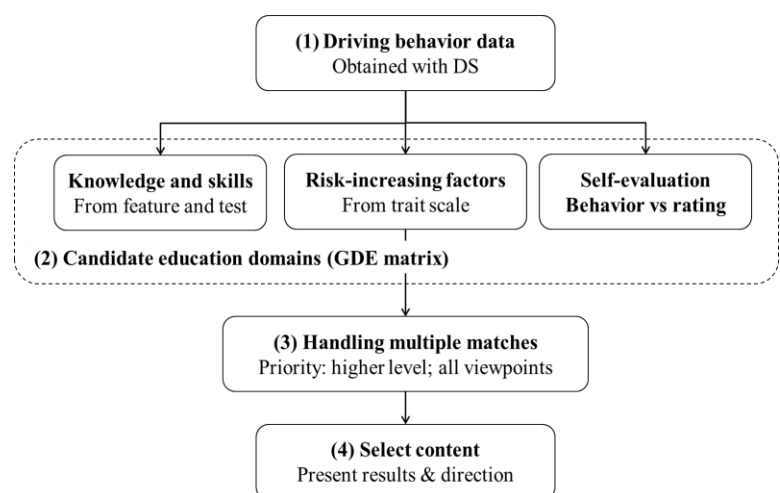


Fig. 1 Structure of the traffic safety education program