

Effectiveness Evaluation of an Age-Adjusted D-Call Net Algorithm for Fatal and Severe Injury Prediction

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D-Call Net is an Advanced Automatic Collision Notification (AACN) system that estimates the probability of fatal and severe injuries using vehicle crash information and supports emergency medical response. In the current system, occupant age cannot be obtained at the time of notification, and the injury probability is calculated assuming that all occupants are aged 65 years or older. However, age is an important factor affecting injury severity and may influence prediction accuracy. Therefore, this study evaluated the influence of the current age assumption and investigated accident characteristics related to age that may contribute to further improvement of injury severity prediction.

D-Call Net notification data from 2021 to 2024, consisting of 15,665 cases, were matched with the National Police Agency open accident database and the ITARDA integrated accident database. As a result, 4,520 accidents involving 4,522 drivers were obtained for analysis. The matched dataset showed that the average driver age was 46.6 years, and drivers aged 65 years or older accounted for 17.6% of the data.

When actual age information was applied to the injury prediction algorithm, the number of detected fatal and severe injury cases increased from 76 to 84, representing an approximately 11% improvement in detection performance. This result indicates that the current age assumption may affect prediction performance, especially for younger age groups (Fig.1).

In addition, age-related differences were observed in several accident characteristics, including impact direction, seatbelt use, accident time period, and road width. In particular, the daytime and nighttime accident distribution differed by age group, suggesting that accident characteristics associated with age may be useful for indirectly reflecting age-related risk when occupant age is unavailable (Fig.2).

Therefore, combining multiple factors associated with age may help improve injury severity prediction without directly obtaining occupant age.

These findings suggest the possibility of improving future D-Call Net injury prediction algorithms by incorporating age-related accident characteristics.

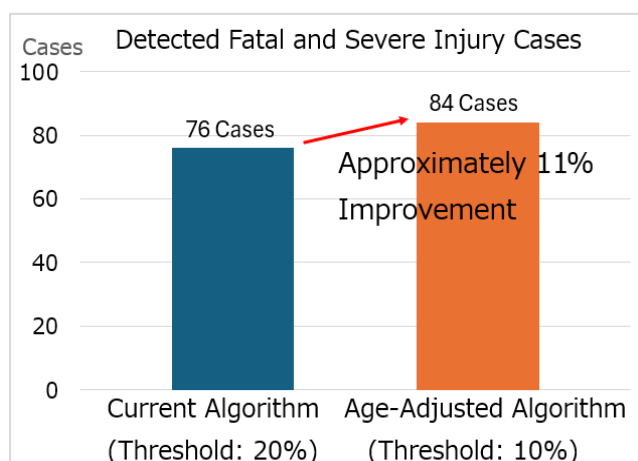


Fig.1 Comparison of Detected Fatal and Severe Injury Cases

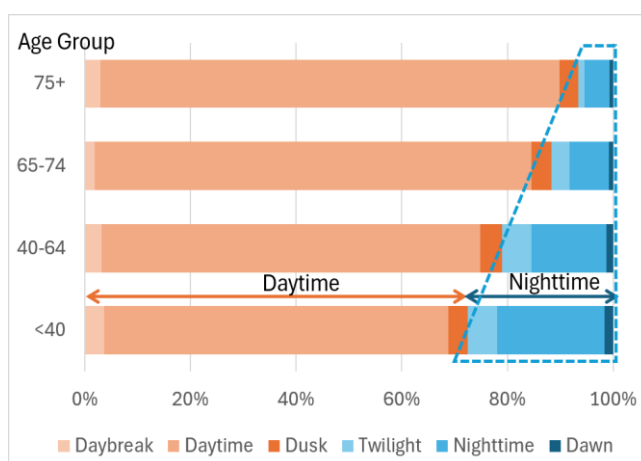


Fig.2 Daytime and Nighttime Accident Distribution by Age Group