Real-time safe driving score evaluation

FORUM8®

13th CPWC

STRL Team

Background

50% of Car Accidents on urban areas occur within intersections. Driving habits and behavior affects driver's safety. With the advent of Web 4.0,enhanced game-like interactions between humans and machines would make it possible to support road safety.
Therefore with application of UC-win/Road and Python Programming.
A simulated driving competence score could motivate drivers to practice safe driving. The simulation of UC-win/Road and driving score dashboard enables to monitor habit and behaviors.

System Architecture

<1> Experimental Network Setup

UC win/Road

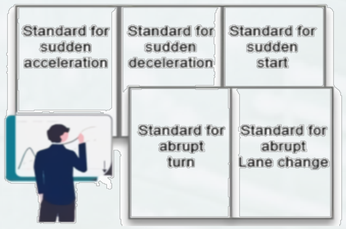
<2> Python Development Environment Setup

Use python libraries

<3> Driver Data Collection via UDP

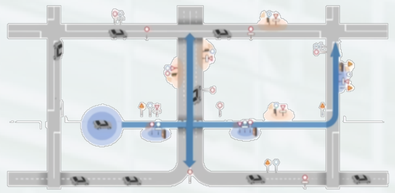
Python-based

<4> Establishing Evaluation Criteria For Dangerous Driving Behavior



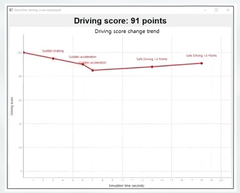
Referencing the standards of governmental traffic safety organizations

<5> Development of a Dangerous Driving Behavior Evaluation Algorithm



Development of a Dangerous Driving Behavior Evaluation Algorithm

<6> Development of a Real-time Safe Driving Score Display Feature



Development of the safe driving score Penalty and recovery feature

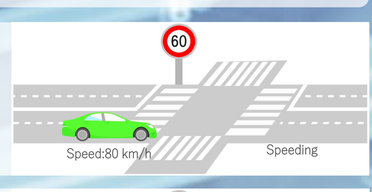
The system receives live vehicle dynamics data via UDP, including speed, acceleration, and yaw rate.
Our algorithms evaluate seven types of dangerous driving behaviors, such as speeding, sudden braking, and abrupt turns, based on criteria from official traffic safety agencies.

Algorithm

Evaluation Criteria for Dangerous Driving

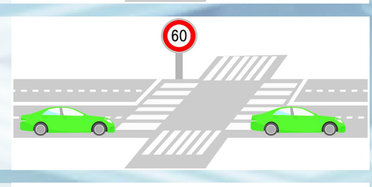
Speeding

It's speeding if you driving more than 20km/h over the 60 km/h speed limit.



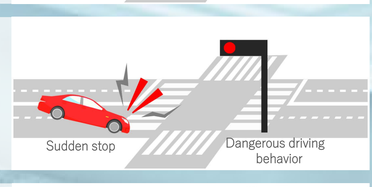
Rapid Acceleration

It's rapid acceleration if you accelerate by 8km/h or more per second while driving over 20km/h.



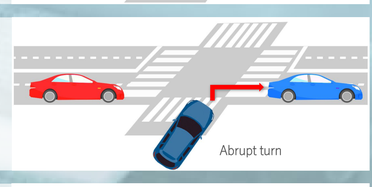
Sudden Stop

It's a sudden stop if you decelerate by 14km/h or more per second from a speed of 5km/h or less.



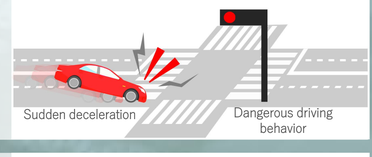
Abrupt Turn

It's a sudden turn if you make a 60° to 160° turn within 2seconds while driving over 30km/h.



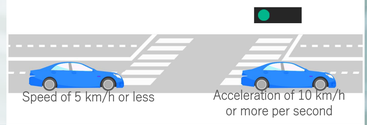
Sudden Deceleration

It's sudden deceleration if you decelerate by 15km/h or more per second while driving at or below 50km/h.



Sudden Start

It's a sudden start if you accelerate by 10km/h or more per second from a speed of 5km/h ore less.



Abrupt Lane Change

It's a sudden lane change if, while driving over 30km/h, you change lanes with a urn rate of 10° /sec or more and then drive straight for 5seconds with minimal change in speed.

Future

This system is capable of informing the habits and behaviors of the drivers in real time.
Therefore, utilization as a guideline for safe driving is achievable.
This system can expand to evaluation of autonomous vehicle in the future.