

## **1. Identify uncertainties when driving a car**

### **1-1 Interference or lane change**

Changing lanes while driving is an essential process for getting to your destination. However, there is a lot of uncertainty here. We predict the movement of the car by blinking before changing lanes. But this is an event caused by a driver trying to change lanes. Therefore, it is difficult for the car behind to predict ahead and to stochastically prevent accidents. Although not unknown, it is close to uncertainty with a concept that cannot represent a probability distribution table.

### **1-2 Accident caused by drowsy driving while driving**

Driving at night causes a lot of accidents on the old highway. But there are a lot of variables to prevent by showing this as a probability. So it's more of an uncertainty. In particular, sleepiness is not an event caused by any prediction, so it is difficult to define it as a probability.

## **2. Define a probabilistic model of it**

### **2-1 Predict sudden interventions or lane changes**

It is difficult to directly predict sudden lane changes. However, it can be prevented by obtaining the car's lane change probability and providing it to the driver in advance. For lane change probabilities, the following models are recommended: Using the driver's driving time, the probability can be obtained by comprehensively indicating the number of lane changes and the uncertainty of the safety distance. If the probability of lane change is obtained and the information is provided to the surrounding driver, the accident can be prevented. Define the probability that the driver will change lanes by time,  $P(A)$ , and  $P(B)$  for time-to-time non-safety distance assurance. If so, define  $P(A|B)$ , i.e. when you change lanes, you will find the probability that the vehicle in that lane and the safe distance will not be reached. This probability is not a direct accident probability, but it can be a probability model that can prevent risk at that interval.

### **2-2 Predicting and preventing accidents caused by drowsy driving while driving**

There are many difficulties in finding the probability of drowsy driving while driving. However, I think it can prevent accidents if you look at it loudly. Based on the drowsy driving section, the probability of accidents by time zone is obtained. For example, there are many accidents in A section around 8 in the evening. 50% of them are assumed to be caused by drowsy driving. Defines the probability of an accident when drowsy driving as  $P(A)$  and the probability of an accident in the evening as  $P(B)$ . If so, the probability of an accident due to drowsy driving is shown by  $P(B|A)$ . Providing a probabilistic model for the driver driving in that

section can prevent pre-accidental accidents.