How to Characterize Driving Behaviors: Insurance Plans

16 MAY 2016 BY NEDA NAVIDI AND RENÉ JR LANDRY

Introduction

In recent years, the rate of vehicle accident fatalities has been one of the main concerns in rural and urban communities. The Public Health Agency of Canada (PHAC) reported more than 2,209 fatalities and 11,451 serious injuries in 2011 [1]. Car accidents result in added expenses for governments, namely in medical treatments, rehabilitation assistance, and property damages. Such expenses are estimated to exceed one hundred billion dollars per year in Canada [1].

Vehicle tracking is one of the significant concerns for insurance and the vehicle rental companies. It is used to monitor the location of a truck, car, or any moving vehicle using the GPS system. Widely deployed to keep track of truck fleets, vehicle tracking ensures that the vehicles are being used properly and that they can be recovered in the event of a theft [2]. Another important parameter is driver behavior. It can be defined as what the driver does (as opposed to what the driver can do, which is known as “driver performance”) [3].

For insurance companies, monitoring driver behavior helps develop new ways to insure customers: pricing solutions based on car usage. Several models of insurance coverage are
now being proposed [4].

**Pay as You Drive (PAYD)**

The simplest model which takes into account the distance you drive. Dynamic models could take into account the time you take to cover the distance, your speed, the time of day, etc. To measure the distance, insurance companies need to install an On-Board Diagnostic (OBD) system in the car. This system measures the hours when you drive, the distance, the time spent in the car, the routes taken, etc. [5].

**Pay How You Drive (PHYD)**

Desjardins, one of the largest car-insurance companies in Canada, describes how PHYD works: “Pay How You Drive policies use GPS technology to measure how a vehicle is being driven – insurers then use this information to make judgements about driving performance. This information is considered together with other traditional risk factors, such as a driver’s age and occupation, to set premiums. ‘Safe’ drivers will usually benefit from lower premiums than ‘less safe’ drivers [6].” Here is an example of how Desjardins offers PHYD to Canadians:

**Pay Where You Drive (PWYD)**

This plan takes into account where you drive and offers rates accordingly.

**Research Study**

These models of insurance coverage collect data to help insurance companies make judgements about driving performance; they are also referred to as driving behaviors. In this paper, the parameters involved in using the driving behaviors include the vehicle position, the longitudinal and lateral accelerations, and so the velocity. Moreover, the environmental scenarios include the vehicle inter-distance and lane change related to lane keeping. Some of these measurements can be obtained by Global Navigation Satellite Systems (GNSS) and Inertial Navigation Systems (INSS), while others can be obtained using the On-Board Diagnostic (OBD) system of the vehicle. However, a discussion on how to obtain the raw measurements is not the goal of this paper. The contribution of this paper is to propose a new a new fuzzy inference systems (FIS) model to be used for characterizing driving behavior and, evaluate this model using two FIS types. In the end, two FIS types will be analyzed and compared in order to select the best one in characterizing driving behaviors.

**Part 2**
The second part of this article, entitled *How to Characterize Driving Behaviors: Classification Methods*, presents the different methods of classifying driving behaviors, the study that was conducted, and the conclusion of the research article.

**Research Paper**

For more information on this project, please see the following article:


**Research Projects at the Lassena Laboratory**

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**REFERENCES**


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