Driver Behavior Analysis and Identification

Analysis of driver behavior on the road is essential both for insurance companies and transportation policy makers as well as the drivers themselves. Insurance companies rely on traditional investigation techniques of car exterior and accident reports in order to determine insurance premiums. Providing accurate models of driver behavior on the road provides more realistic assessments of premiums. The same behavior models can be used by policy makers in order to assess road and traffic conditions and label the different roads according to the prevalent type of behavior exhibited by respective road travelers. This road labeling and categorization in turn help provide personalized route recommendations to drivers based on their own driving behavior as well as the roads most accommodating of that behavior.

This project aims at investigating and developing techniques for providing accurate driver behavior modeling via the analysis of data collected using an OBD-II dongle installed in a car. The dongle will collect data from the OBD sensors and the vehicle's internal sensors, and then upload this data via a 3G cellular shield to a server where data is filtered and analyzed. Analysis involves the development of techniques that can infer robust correlations between certain data values and specific actions performed by the driver that indicate a certain behavior cue. Behavior cues (or attributes) are to be extracted from the collected data related to driver speed, acceleration, and steering angle. Distinctive behavior profiles should then be constructed from groups of indicative behavior cues or attributes (e.g. certain speed levels coupled with certain steering angles may be indicative of aggressive overtake, while different levels may indicate reckless behavior at road curvatures). Each sensor's contribution to the accuracy of identifying a behavior profile should be assessed. Auxiliary sources of data, such as smartphone sensors and digitized road features, can be used to further support the validity of the extracted behavior attributes.

Hardware platforms

- OBD II telematics kit
- 3G cellular shield
- A vehicle of a recent model for testing

Software skills needed

- Arduino programming
- Server (possible database) programming
- Python, C++, or R for data analysis

Suggested References

1. G. Castignani, T. Derrmann, R. Frank, and T. Engel, "**Driver Behavior Profiling Using Smartphones: A Low-Cost Platform for Driver Monitoring**," *IEEE Intelligent Transportation Systems Magazine*, vol. 7, no. 1, 2015.
2. R.K. Satzoda and M.M. Trivedi, "**Drive Analysis Using Vehicle Dynamics and Vision-Based Lane Semantics**," *IEEE Transactions on Intelligent Transportation Systems*, vol. 16, no. 1, 2015.
3. T. Chakravarty, A. Chowdhury, A. Ghose, C. Bhaumik, and P. Balamuralidhar, "**Statistical analysis of road–vehicle–driver interaction as an enabler to designing behavioral models**," *International Journal of Modeling, Simulation, and Scientific Computing*, vol. 5, no. 1, 2014.