



## Driver identification using digital vehicle data

Model development for driver classification based on digital vehicle data with a focus on within subject variability

### Contact:

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**Languages:** German/English

**Level:** Seminar/Bachelor/Master

### Tasks

- State of the Art
  - Overview on electronic vehicle data available for forensic investigations and sources
  - Natural driving behavior analysis considering physical and mental stress
- Model development for driver classification based on digital vehicle data with a focus on within subject variability
- Optionally: Create your own data especially suitable for assessment of within subject variability

### Background

One major task in forensics is the identification of individuals based on physical evidence found at a crime scene and also in the digital domain. As cars become increasingly reliant on sensors to perform everyday driving operations, acquisition and analysis of these data is more likely to serve as evidence in court (Singleton et al., 2008; Wahab et al., 2009). In the field of digital forensics this could help to solve cases of hit and run accidents and also other activities where vehicles were involved. Moreover, this approach is transferable to other digital behavior data in the context of smart homes and smart cities (Servida and Casey, 2019).

In a previous study (Dolos et al., 2020) we assessed the potential of using in-vehicle digital data (Kwak et al., 2017) to capture the natural driving behavior of individuals in order to identify them. Drivers were identified with high reliability using a combination predicted class probabilities together with the random match probability (RMP) across the time series. Furthermore, several research gaps were identified. One of the most important ones for the application of driver identification in forensics was the question how within subject variability could influence the certainty of the attribution of the evidence data to one suspect.

### Prerequisites

- Knowledgeable in R or Python and statistics
- Familiarity with machine learning is a plus



### Literature

- Dolos, K., Meyer, C., Attenberger, A., Steinberger, J., 2020. Driver identification using in-vehicle digital data in the forensic context of a hit and run accident. FSI Digit. Investig.
- Kwak, B.I., Woo, J., Kim, H.K., 2017. Know Your Master: Driver Profiling-based Anti-theft Method. ArXiv170405223 Cs.
- Servida, F., Casey, E., 2019. IoT forensic challenges and opportunities for digital traces. Digit. Investig. 28, S22–S29. <https://doi.org/10.1016/j.diin.2019.01.012>
- Singleton, N., Daily, J., Manes, G., 2008. Automobile Event Data Recorder Forensics, in: Ray, I., Sheno, S. (Eds.), Advances in Digital Forensics IV. Springer US, Boston, MA, pp. 261–272. [https://doi.org/10.1007/978-0-387-84927-0\\_21](https://doi.org/10.1007/978-0-387-84927-0_21)
- Wahab, A., Chai Quek, Chin Keong Tan, Takeda, K., 2009. Driving Profile Modeling and Recognition Based on Soft Computing Approach. IEEE Trans. Neural Netw. 20, 563–582. <https://doi.org/10.1109/TNN.2008.2007906>