

## **Analysing structure of vehicle service records**

This project aims at analysing historical records of workshop visits for over 4000 Volvo trucks over a period of more than 10 years. The idea is to use data mining and machine learning techniques in order to find structure and regularities in this data. From both scientific and practical point of view, it is interesting to provide classification (either as a taxonomy or an ontology) of different service events. We have access to the data containing different vehicles, different faults and different components. The goal is to extract knowledge as to what are the most common faults and/or long term driving cost factors. For example, it is very important to distinguish between repair and maintenance actions, as well as between operations affecting different subsystems of the truck. Moreover, by analysing the frequency and cost of different repairs, together with finding relations and dependencies between various classes of them, one can expect to significantly decrease cost and increase effectiveness of maintenance and diagnosis.

### **Prerequisites:**

The thesis project assumes that the student has taken the Cooperating Intelligent Systems course and, preferably, Learning Systems course.

### **Contact information:**

Slawomir Nowaczyk: [slawomir.nowaczyk@hh.se](mailto:slawomir.nowaczyk@hh.se)

Stefan Byttner: [stefan.byttner@hh.se](mailto:stefan.byttner@hh.se)

Thorsteinn Rögnvaldsson: [thorsteinn.rognvaldsson@hh.se](mailto:thorsteinn.rognvaldsson@hh.se)

## **Evaluating influence of usage patterns on maintenance of trucks**

As modern vehicles become more complex, due to increased number of components and extended functionality, it is becoming very costly to develop diagnostic and maintenance software. On the other hand, there is an increasing number of possibilities for collecting and processing historical usage data about those vehicles. In this project we are interested in developing automatic (self-organised) methods for combining data from Volvo truck service histories with database of truck usage statistics. The goal is to find patterns that would explain conditions under which vehicles require more (or less) maintenance and/or repairs than is typical for their vehicle type. Based on the historical records of workshop visits and analysis of logged internal data, this project aims at finding correspondence between different classes of vehicle usage and different classes of vehicle reliability. For example, answering questions such as "are long-haul or delivery trucks more costly to maintain" can have important impact both from scientific and economic point of view.

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Slawomir Nowaczyk: [slawomir.nowaczyk@hh.se](mailto:slawomir.nowaczyk@hh.se)

Stefan Byttner: [stefan.byttner@hh.se](mailto:stefan.byttner@hh.se)

Thorsteinn Rögnvaldsson: [thorsteinn.rognvaldsson@hh.se](mailto:thorsteinn.rognvaldsson@hh.se)

**Mining onboard data using questionnaires**

This thesis suggests exploring (mining) of data collected onboard a fleet of trucks with the help of documented driver experiences. Onboard data has been collected on thirty trucks while driving real transport missions in Europe as part of evaluating the benefit of active safety systems. The truck drivers experiences of the trucks have at the same time been collected by having them answer questionnaires. The purpose of the thesis is to explore the data by using the questionnaires, e.g. if there are relations between the quality experience of a truck and the onboard data, or if there is a relation between the driver skill level (by using features such as age) and relevant representations of onboard data. Such information could then e.g. potentially be used to control the active safety systems.

**Prerequisites:**

The thesis project assumes that the student has taken the Learning systems course. The thesis project assumes that the student is capable of travelling to Gothenburg on a weekly basis.

**Contact information:**

Slawomir Nowaczyk: [slawomir.nowaczyk@hh.se](mailto:slawomir.nowaczyk@hh.se)

Stefan Byttner: [stefan.byttner@hh.se](mailto:stefan.byttner@hh.se)

Thorsteinn Rögnvaldsson: [thorsteinn.rognvaldsson@hh.se](mailto:thorsteinn.rognvaldsson@hh.se)