BOMBARDIER

Master's Thesis:

Artificial Intelligence for classification of Balise health status

Background

Bombardier Transportation is a global mobility solution provider leading the way with the rail industry's broadest portfolio. It covers the full spectrum of solutions, ranging from trains to sub-systems and signalling to complete turnkey transport systems, e-mobility technology and data-driven maintenance services. Combining technology and performance with empathy, Bombardier Transportation continuously breaks new ground in sustainable mobility by providing integrated solutions that create substantial benefits for operators, passengers and the environment.

In Stockholm, we develop Train onboard safety systems and wayside equipment.
expectation from these systems are high reliability and high availability. Most of the subsystems are producing log files to be able to analyse their behaviour in case of unexpected result. Many factors can affect the behaviour of a system like the railway, the train model or sometime the human factor or installation deviations. Finding the root cause of any technical issue are often time consuming and require from the engineer a total knowledge of the failing system. With this master-thesis project, we want to explore the possibilities of Artificial intelligence and see if it could help us improve the maintenance situation for Balises as well as train related EMC issues.

The Balise Transmission Module in the Train receives telegrams from wayside Balises that is used to inform the train of location, speed restrictions etc. The Module also has got data that can be used to characterize each Balise it reads. The data, i.e. amplitude characteristics, can be manually inspected and classified as Healthy, weak, start-up problem, intermittent, absent, EMC problem etc. This is a time-consuming task to perform manually. The idea is to explore if an AI approach may perform the classification automatically. Automatic classification of Balise health has the potential of being used for an early warning system, so that a Balise can be flagged for exchange before it has a total failure, i.e. for Preventive Maintenance.

Objective

The main objective of the master's thesis is to evaluate the potential of state-of-the-art machine learning or AI algorithms in the analysis of incoming waveform data in our train mounted Balise Transmission Module.

The project will consist in the following tasks:

1. Do a technological survey of available algorithms and identify the ones that are more appropriate in our context: analysis of waveform shapes and other data. (research part)
2. Based on the results in part one, choose a sub-system to evaluate and a fitting algorithm and make a working model.
3. Demonstrate and iterate if necessary

Application

The candidate is likely to have studied Computer Science, Electrical Engineering, Information Technology or similar at a Bachelor or Master level. He or she shall have validated some classes related to machine learning and/or Artificial intelligence. Some level of software design interest is likely to be beneficial.
The candidate will be expected to be autonomous.
This master thesis can fit 2 students if the candidates' profiles are relevant.

For more information, contact

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