1.

Master's Thesis

Railway equipment anomaly detection with failure biased data

Alstom is a multinational rolling stock manufacturer operating worldwide in rail transport markets, active in the fields of passenger transportation, signalling, and locomotives.

Alstom's portfolio 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, Alstom continuously breaks new ground in sustainable mobility by providing integrated solutions that create substantial benefits for operators, passengers, and the environment.

Background

In Stockholm, we develop train onboard safety systems and wayside equipment.
The expectations towards these systems are high reliability and high availability. Most of the subsystems produce log files which enables analysis of a its behaviour in case of an unexpected result. Many factors can affect the behaviour of a system like the railway itself, the train model, and in some cases the human factor or installation deviations. Finding the root cause of any technical issue is often time consuming and requires that the engineer has deep knowledge of the failing system.

Anomaly detection for continuous logs is a useful approach to start off a root cause analysis of complex systems. However, in these systems, logs are not continuously collected. Log collection is only done when unexpected behaviour is identified by the integrator or driver. This leads to a dataset which is inherently biased towards failure.

With this master-thesis project, the aim is to identify statistical and/or deep learning methods for anomaly detection of failure biased data.

Objective

The main objective of the master's thesis is to identify methods for anomaly detection of logs collected on deviations and errors in our train control systems and their sub-systems.

The project will consist of the following tasks:

1. Do a technological survey of available methods and identify the most promising methods for our context: logs of deviations and errors from sub-systems used in train control and safety equipment. (Research part.)
2. Based on the results in part one, evaluate methods against data from the field
3. Demonstrate and iterate if necessary

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2.

GUI för beräkningsverktyg

Uppdragsgivare
AlstomVästerås – System avdelningen för traktionsutveckling

Beskrivning av ämnet
Ta fram ett nytt GUI/användargränssnitt till vårat intern utvecklade beräknings verktyg APC.
APC är ett beräkningsverktyg som används för dimensionering av drivsystem för tåg. APC beräkningarna görs idag i en Fortran/C kärna medans resultaten och efterbehandlingen sker i Excel. Beräkningsresultaten exporteras sedan från GUI:t.

Det nya GUI:t ska ersätta och utöka funktionaliteten som det befintliga Excel baserade ger idag. Det ska vara modifierbart och flexibelt.

Omfattning
Examensarbetet omfattar:
-Lära sig grunderna i APC, ta reda på behoven från användarna.
-Ta fram en specification för ett nytt GUI
-Implementare ett nytt GUI.
-Verifiera funktion

Beroende på kandidat så kan uppdraget anpassas. Erfarenhet/intresse för GUI och programmering är en förutsättning.

Kontaktinformation
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3.

Onboard platform performance measure

We create smart innovations to meet the mobility challenges of today and tomorrow. We design and manufacture a complete range of transportation systems, from high-speed trains to electric buses and driverless trains, as well as infrastructure, signalling and digital mobility solutions. Joining us means joining a truly global community of more than **75 000** people dedicated to solving real-world mobility challenges and achieving international projects with sustainable local impact.

An agile, inclusive and responsible culture is the foundation of our company where diverse people are offered excellent opportunities to grow, learn and advance in their careers. We are committed to encouraging our employees to reach their full potential, while valuing and respecting them as individuals.

As a master of science internship, you will be part of the Integration Testing team. We are working on platform that includes both hardware and software. Those platforms are part of onboard system called ETCS. We are continuously using the feedback from field to reinforce our testing. Your main responsibility will be to support the team in measuring the performance of the platform.

First you will learn and understand why and how we measure performance, you will help collect the data and facilitate their analysis. Then you will propose some optimization like automatizing some measures, sharing them efficiently. In the end, you need to explain how to maintain the implemented solution.
You need to be curious, interested in Big Data Management and Business Intelligence. Experience in SQL, Python, BI tools is a plus. English is our day to day working language.

Contact

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4.

Master's Thesis:

Fault slip through analysis

Background

Because we are developing high availability safety critical applications it is important to have good feedback mechanisms to know which type of defects that slip through our current testing efforts. Today we do not measure this on a regular basis. Therefore, it would be a good initiative to identify which and how many of our known defects that slip through our current test activities of component testing, sub-system testing, system testing and to the customer.

Objective

To analyze and measure which defects that slip through our current test activities and to the customer.

The project will consist of the following tasks:

1. Do a defect analysis of found defects in component testing. Also identify which defects that are found later that should have been able to find in component testing.
2. Do a defect analysis in the same way on sub-system level, i.e. to identify found categories of defects and which defects that slip through to a later phase or to the customer.
3. Do a defect analysis on system level to identify which types of defects are found and which defects slips through to the customer.
4. Make a conclusion of all defects found by the customer to identify where they should have been found earlier.

Application

Prerequisites: Good analytical ability and complex system knowledge. Knowledge in software test techniques and root cause analysis is also valuable.

For more information, contact

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