Towards Signalling Maintenance Scheduling for European Railway Traffic Management System

The European Railway Traffic Management System (ERTMS) is the newest signalling standard that has been introduced in the railway industry. The aim of ERTMS is to ensure better signalling communication amongst various train systems, and hence, to help in attaining improved connectivity and commuting between European countries.

In various countries across the world, there is a gradual shift from the current signalling systems to ERTMS. Amongst the European countries, Denmark was the first country to commence a full upgrading of its signalling system to ERTMS. A variety of maintenance requirements arise when entirely different hardware is used in the new system, which is essentially new on-board signalling equipment. In addition, to achieve a rapid response in the event of breakdowns or failures, the new recovery systems define very stringent time restrictions, in contrast to the current signalling system. Therefore, the entire maintenance system needs to change from the previous system to the newest system, and hence, new optimisation techniques need to be established so as to facilitate managers in creating ideal maintenance strategies.

The aim of this thesis is to develop new maintenance plans for the Danish Railway system, which are useful for the current signalling system based on colour-light signalling and also useful for changing to ERTMS. Considering the maintenance structure of Denmark, which is a decentralised structure, this thesis first presents a pre-phase to the scheduling phase, which is a partitioning approach for carrying out region splitting. This technique was developed due to an industrial need to categorise the maintenance region based on the tasks and the crew locations.

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