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Data-driven Maintenance Optimization Using Random Forest Algorithms

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In this paper, a multi-component series system is considered which is periodically inspected and at inspection times the failed components are replaced by a new one. Therefore, this maintenance action is perfect corrective maintenance for the failed component, and it can be considered as imperfect corrective maintenance for the system. The inspection interval is considered as a decision parameter and the maintenance policy is optimized using long-run cost rate function. It is assumed that there is no information related to components' lifetime distributions and their parameters. Therefore, an optimal decision parameter is derived considering historical data (a data storage for the system that includes information related to past repairs) using density estimation and random forest algorithms. Eventually, the efficiency of the proposed optimal decision parameter according to available data is compared to the one derived when all information on the system is available.

keywords: Maintenance Optimization, Data-driven Estimation, Random Forest Algorithm.

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