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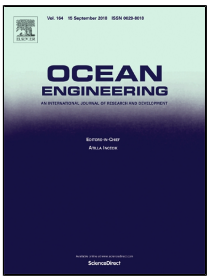

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Use of tree based methods in ship performance monitoring under operating conditions

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Abstract

Monitoring of operational efficiency in ship fleets is a complex maritime problem which requires an analytical approach in order to provide satisfactory solutions. Since the problem involves high-dimensional data, this paper develops tree-based modelling on bagging, random forest and bootstrap approach to analyse the ship performance under operational condition. To demonstrate the proposed model, the publicly accessible dataset for 254 trips derived from a particular designed acquisition system on-board ferry ship is utilized. In operational variable analysis on speed through water and fuel consumption, the bootstrap approach yields more accurate prediction rate than random forest and bagging. The proposed model is superior to the others such as ANN and GP applications in ship performance monitoring. Consequently, the tree based model adopting bagging, random forest, and boosting environment is capable of increasing the predictive performance during monitoring of ship performance in maritime industry. Beside its theoretical insight, the findings of the paper contribute ship management companies to monitor ship operational performance.

Keywords: ship performance monitoring, statistical learning, operation management, maritime industry.

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