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Anomaly detection in vessel tracking - A Bayesian networks (BNs) approach (Article)

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Abstract

The paper describes the supervised method approach to identifying **vessel anomaly** behaviour. The **vessel anomaly** behaviour is determined by learning from self-reporting maritime systems based on the Automatic Identification System (AIS). The AIS is a real world **vessel** reporting data system, which has been recently made compulsory by the International Convention for the Safety of Life and Sea (SOLAS) for **vessels** over 300 gross tons and most commercial **vessels** such as cargo ships, passenger **vessels**, tankers, etc. In this paper, we describe the use of Bayesian networks (BNs) approach to identify the behaviour of the **vessel** of interest. The BNs is a machine learning technique based on probabilistic theory that represents a set of random variables and their conditional independencies via directed acyclic graph (DAG). Previous studies showed that the BNs have important advantages compared to other machine learning techniques. Among them are that expert knowledge can be included in the BNs model, and that humans can understand and interpret the BNs model more readily. This work proves that the BNs technique is applicable to the identification of **vessel anomaly** behaviour. © 2015: The Royal Institution of Naval Architects.

Indexed keywords

Engineering controlled terms: Artificial intelligence; Automation; Directed graphs; Graph theory; Learning algorithms; Learning systemsAutomatic identification system; Bayesian Networks (bns); Commercial **vessels**; Directed acyclic graph (DAG); International conventions; Machine learning techniques; Probabilistic theory; Supervised methods**Engineering main heading:** Bayesian networks

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