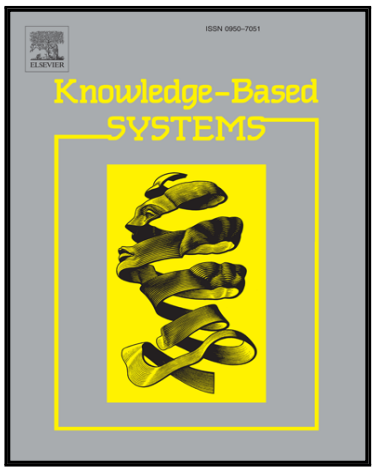

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Fuzzy Competence Model Drift Detection for Data-driven Decision Support Systems

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Abstract

This paper focuses on concept drift in business intelligence and data-driven decision support systems (DSSs). The assumption of a fixed distribution in the data renders conventional static DSSs inaccurate and unable to make correct decisions when concept drift occurs. However, it is important to know when, how, and where concept drift occurs so a DSS can adjust its decision processing knowledge to adapt to an ever-changing environment at the appropriate time. This paper presents a data distribution-based concept drift detection method called fuzzy competence model drift detection (FCM-DD). By introducing fuzzy sets theory and replacing crisp boundaries with fuzzy ones, we have improved the competence model to provide a better, more refined empirical distribution of the data stream. FCM-DD requires no prior knowledge of the underlying distribution and provides statistical guarantee of the reliability of the detected drift, based on the theory of bootstrapping. A series of experiments show that our proposed FCM-DD method can detect drift more accurately, has good sensitivity, and is robust.

Keywords: Concept drift, data-driven decision making, fuzzy sets theory, competence model

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