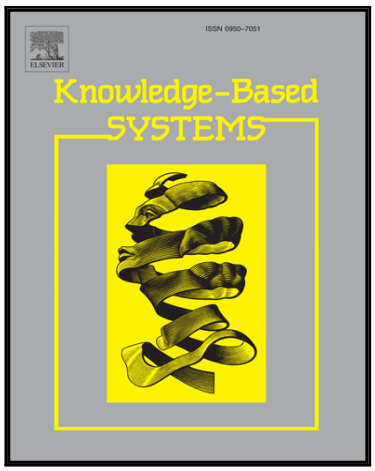

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Three-way Decision Support for Diagnosis on Focal Liver Lesions

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Abstract

Malignant Focal Liver Lesion (FLL) is a main cause of primary liver cancer. In most existing Computer-Aided Diagnosis (CAD) systems of FLLs, machine learning and data mining methods have been widely applied to classify liver CT images for diagnostic decision making. However, these strategies of automatic decision support depend on data-driven classification methods and may lead to risky diagnosis on uncertain medical cases. To tackle the drawback, we expect to integrate the objective judgments from classification algorithms and the subjective judgments from human expert experiences, and propose a data-human-driven Three-way Decision Support for FLL diagnosis. The methodology of three-way decision support is motivated by Three-way Decision (3WD) theory. It tri-partitions the FLL medical records into certain benign, certain malignant and uncertain cases. The certain cases are automatically classified by decision rules and the challenging uncertain cases will be carefully diagnosed by human experts. Therefore, the method of three-way decision support can balance well the risk and efficiency of decision making. The workflow of three-way decision support for FLL diagnosis includes the stages of semantic feature extraction, three-way rule mining and decision cost optimization. Abundant experiments demonstrate that the proposed three-way decision support method is effective to handle the uncertain

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