
**Abstract.** Learning from patient records may aid medical knowledge acquisition and decision making. Decision tree induction, based on ID3, is a well-known approach of learning from examples. In this article we introduce a new data representation formalism that extends the original ID3 algorithm. We propose a new algorithm, ID+, which adopts this representation scheme. ID+ provides the capability of modeling dependencies between attributes or attribute values and of handling multiple values per attribute. We demonstrate our work via a series of medical knowledge acquisition experiments that are based on a “real-world” application of acute abdominal pain in children. In the context of these experiments, we compare ID+ with C4.5, NewId, and a Naive Bayesian classifier. Results demonstrate that the rules acquired via ID+ improve decision tree clinical comprehensibility and complement explanations supported by the Naive Bayesian classifier, while in terms of classification, accuracy decrease is marginal.