

Building a Medical Decision Support System for Colon Polyp Screening by Using Fuzzy Classification Trees

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Abstract

To deal with highly uncertain and noisy data, for example, biochemical laboratory examinations, a classifier is required to be able to classify an instance into all possible classes and each class is associated with a degree which shows how possible an instance is in that class. According to these degrees, we can discriminate the more possible classes from the less possible classes. The classifier or an expert can pick the most possible one to be the instance class. However, if their discrimination is not distinguishable, it is better that the classifier should not make any prediction, especially when there is incomplete or inadequate data. A *fuzzy classifier* is proposed to classify the data with noise and uncertainties. Instead of determining a single class for a given instance, *fuzzy classification* predicts the degree of *possibility* for every class.

Adenomatous polyps are widely accepted to be precancerous lesions and will degenerate into cancers ultimately. Therefore, it is important to generate a predictive method that can identify the patients who have obtained polyps and remove the lesions of them. Considering the uncertainties and noise in the biochemical laboratory examination data, *fuzzy classification trees*, which integrate decision tree techniques and fuzzy classifications, provide the efficient way to classify the data in order to generate the model for polyp screening.