

## From Type-I to Type-II Fuzzy System Modeling for Diagnosis of Hepatitis

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**Abstract :** Hepatitis is one of the most common and dangerous diseases that affects humankind, and exposes millions of people to serious health risks every year. Diagnosis of Hepatitis has always been a challenge for physicians. This paper presents an effective method for diagnosis of hepatitis based on interval Type-II fuzzy. This proposed system includes three steps: pre-processing (feature selection), Type-I and Type-II fuzzy classification, and system evaluation. KNN-FD feature selection is used as the preprocessing step in order to exclude irrelevant features and to improve classification performance and efficiency in generating the classification model. In the fuzzy classification step, an "indirect approach" is used for fuzzy system modeling by implementing the exponential compactness and separation index for determining the number of rules in the fuzzy clustering approach. Therefore, we first proposed a Type-I fuzzy system that had an accuracy of approximately 90.9%. In the proposed system, the process of diagnosis faces vagueness and uncertainty in the final decision. Thus, the imprecise knowledge was managed by using interval Type-II fuzzy logic. The results that were obtained show that interval Type-II fuzzy has the ability to diagnose hepatitis with an average accuracy of 93.94%. The classification accuracy obtained is the highest one reached thus far. The aforementioned rate of accuracy demonstrates that the Type-II fuzzy system has a better performance in comparison to Type-I and indicates a higher capability of Type-II fuzzy system for modeling uncertainty.

**Keywords :** hepatitis disease, medical diagnosis, type-I fuzzy logic, type-II fuzzy logic, feature selection

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