

# Recommendations in CDSS using Fuzzy Formal Concept Analysis

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## Abstract

One of the hot topics in clinical research is the hidden knowledge discovery in datasets with a high number of features (variables or attributes). We approach how to provide recommendations in Clinical Decision Support Systems (CDSS) to guide the experts in the diagnostic process.

The dataset used is an openly sharing neuroimaging data from 1100 subjects with 162 graded attributes, that is, features with a degree of certainty. The knowledge retrieved from the dataset is shaped like graded implications which will be manipulated using some automated methods based on logic. These methods guide the experts in the diagnostic process establishing a recommendation.

In this paper, we work in the framework of Fuzzy Formal Concept Analysis (FCA) and in it, the first task will be the mining of the graded implications from the dataset using the NEXTCLOSURE for Graded Attributes [1].

The problem of reasoning with these graded implications is approached with the so-called *Fuzzy Attribute Simplification Logic* [2]. This logic leads to some automatic reasoning methods for implications in data with grades.

As the number of graded implications mined from the fuzzy formal context is huge and with a high degree of redundancy we will obtain a equivalent set without redundancy applying the rules of our logic.

Finally, we approach the diagnosis medical problem in datasets with graded attributes using FASL to obtain a CDSS system by offering to the expert a recommendation about the diagnosis process. We propose to use SLFD attribute closure algorithm [4] as the engine of the feature recommendation (symptoms, phenotypes, signs) of the items (diseases) of the dataset.

## Referencias

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