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New Methods for Handling Uncertainty and Imprecision in Classification Applications in medicine

The abstract of a PhD dissertation

The dissertation proposes new approaches to handling data imperfections, understood as uncertainty or imprecision, in data classification, analyzed from both theoretical and practical perspectives. The research primarily focused on practical applications, with particular emphasis on medical diagnostics. The theoretical part involved the development of new measures of inclusion, similarity, and entropy for interval-valued fuzzy sets, which were applied to the representation of data affected by uncertainty and imprecision. In the applied part, methods for using these measures at various stages of classifier construction were proposed. The developed solutions were adapted to the specifics of decision support based on medical data. As part of comprehensive classification support, new approaches to missing data imputation and attribute reduction were also introduced. The proposed methods were tested on real clinical datasets, including breast cancer treatment, cardiovascular disease diagnostics, and depression prevention, i.e., early detection of the risk of depressive episodes.