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Multiple Fuzzy Classification Systems

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Preface

Exploratory data analysis is a vital set of methods used in various engineering, scientific and business applications. Fuzzy classifiers are important tools in this growing field. They use fuzzy rules and do not require assumptions common to statistical classification.

Rough set theory is useful when data sets are incomplete. It defines a formal approximation of crisp sets by providing the lower and the upper approximation of the original set. Systems based on rough sets have natural ability to work on such data and we do not have to preprocess incomplete vectors before classification.

To achieve better performance than existing machine learning systems, we combine them in ensembles. Such ensembles consists of a finite set of learning models, usually weak learners. In the book two popular methods are applied – boosting and negative correlation learning. Both of them help to achieve better accuracy and are not prone to over-fitting.

This book combines three aforementioned fields – fuzzy systems, rough sets and ensembling techniques. As the trained ensemble should represent a single hypothesis, a lot of attention is placed on possibility to combine fuzzy rules from fuzzy systems being members of classification ensemble. We build ensembles of various neuro-fuzzy systems with certain modifications to let the fuzzy rule bases to be activated at the same level. Furthermore, a lot of emphasis is placed on ensembles that can work on incomplete data, thanks to rough set theory. Presented ensembles give information how the number of missing features influences classification accuracy.

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Częstochowa, Poland

Rafał Scherer
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