



SEMINARIUM INSTYTUTOWE

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Multi-adjoint Formal Concept Analysis. Theory and Applications

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Abstract

Due to the inherent imperfection in real databases the fuzzy extension of formal concept analysis (FCA) was a necessity. Multi-adjoint formal concept analysis, introduced by Medina and Ojeda-

Aciego, arose as a fuzzy framework of formal concept analysis focused on introducing a general approach capable of conveniently embed the different fuzzy extensions of concept lattices given in the literature, such as the original framework given by Burusco and Fuentes-González, and the approaches proposed by Belohlavek, Pollandt, Georgescu, Popescu and Krajci. For instance, a general algebraic structure was considered, in which the operators could be non-commutative and non-associative, allowing a more flexible modelling of the examples/dataset. Another interesting feature is that it is possible to consider different adjoint triples or pairs with respect to a given triple of posets, which allows for offering the possibility of considering different degrees of preference on the attributes/objects of a database. These preference degrees can be interpreted as the values of a membership function, modelling a preference on the attributes and/or objects, following the semantics proposed by Zadeh, in which the values represent the intensity of preference in favor of a specific attribute/object. Attribute reduction and size reduction of the concept lattice, and the computation of reducts are significant challenges in this theory, which is fundamental for detecting redundant information and selecting the most relevant variables in the (real) dataset. Different approaches have been introduced with remarkable results. Attribute implications theory is another fundamental challenge in FCA, where recent advances have also been obtained and they have been applied to real cases with good results.

This presentation provides a wide view on multi-adjoint formal concept analysis, including theoretical definitions, properties, and important tasks for which this theory has successfully been applied, such as the commented above attribute reduction and attribute implications theory. In addition, different applications will be shown.