

**Polkowski, Lech****On fractal dimension in information systems. Toward exact sets in infinite information systems.** (English) [Zbl 1012.68218](#)

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Summary: The notions of an exact as well as a rough set are well-grounded as basic notions in rough set theory. They are however defined in the setting of a finite information system i.e. an information system having finite numbers of objects as well as attributes.

In theoretical studies e.g. of topological properties of rough sets one, has to trespass this limitation and to consider information systems with potentially unbound number of attributes. In such setting, the notions of rough and exact sets may be defined in terms of topological operators of interior and closure with respect to an appropriate topology following the ideas from the finite case, where it is noticed that in the finite case rough-set-theoretic operators of lower and upper approximation are identical with the interior, respectively, closure operators in topology induced by equivalence classes of the indiscernibility relation.

Extensions of finite information systems are also desirable from application point of view in the area of knowledge discovery and data mining, when demands of e.g. mass collaboration and/or huge experimental data e.g. in genomic studies call for need of working with large data tables so the sound theoretical generalization of these cases is an information system with the number of attributes not bound in advance by a fixed integer i.e. an information system with countably but infinitely many attributes. In large information systems, a need arises for qualitative measures of complexity of concepts involved free of parameters, cf. e.g. applications for the Vapnik-Czervonenkis dimension. We study here in the theoretical setting of infinite information system a proposal to apply fractal dimensions suitably modified as measures of concept complexity.

**MSC:****68U35** Computing methodologies for information systems (hypertext navigation, interfaces, decision support, etc.)**68T30** Knowledge representationCited in **7 Documents****Keywords:**[rough sets](#); [knowledge discovery](#); [data mining](#)