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Contact, closure, topology, and the linking of row and column types of relations. (English)

Zbl 1231.03058


Summary: Forming closures of subsets of a set $X$ is a technique that plays an important role in many scientific disciplines and there are many cryptomorphic mathematical structures that describe closures and their construction. One of them was introduced by Aumann in the year 1970 under the name contact relation. Using relation algebra, we generalize Aumann’s notion of a contact relation between $X$ and its powerset $2^X$ and that of a closure operation on $2^X$ from powersets to general membership relations and their induced partial orders. We also investigate the relationship between contacts and closures in this general setting and present some applications. In particular, we investigate the connections between contacts, closures and topologies and use contacts to establish a one-to-one correspondence between the column intersections space and the row intersections space of arbitrary relations.

MSC:

03G15 Cylindric and polyadic algebras; relation algebras

03E20 Other classical set theory (including functions, relations, and set algebra)

06A15 Galois correspondences, closure operators (in relation to ordered sets)

68W30 Symbolic computation and algebraic computation

Keywords:
relation algebra; partial order; complete lattice; contact relation; closure operation; topological structure; open set topology; column types; row types; RelView

Software:
RelView

Full Text: DOI

References:


[23] Tarski, A., On the calculus of relations, J. symbolic logic, 6, 73-89, (1941) - Zbl 0061.09730

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