A non-associative generalization of MV-algebras

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Deleting of the associativity law from the definition of MV-algebra, the resulting structure is not an ordered set. Hence we insert two more simple axioms ensuring that the induced relation is ordering. It turns out that we obtain the so-called directoid introduced in 1990 by J. Jezek and R. Quackenbush equipped with switching involutions on every section (i.e., every principal filter). We describe basic properties of these structures and prove that this correspondence is one-to-one. Moreover, the connective "implication" in these non-associative MV-algebras is characterized. We show that the variety of these algebras is congruence regular and congruence arithmetical. Examples of non-associative MV-algebras will be exhibited.