AN AXIOMATIC SETTING FOR QUALITATIVE DECISION MAKING

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The importance of aggregation functions has become apparent not only in mathematics or physics, but especially in applied fields such as engineering, computer science, economics and social sciences. In particular, aggregation functions attracted much attention in decision sciences since they provide an elegant and powerful formalism to model preference. Traditionally, aggregation functions are regarded as mappings of several arguments over a real interval, which are nondecreasing and preserve the boundaries. Typical examples include arithmetic and geometric means, and Choquet integrals.

Such examples, despite producing values that are rather representative of their arguments, rely heavily on the rich arithmetic structure of the real numbers. Thus they are of little use over qualitative domains (such as *very bad, bad, satisfactory, good, very good*) with no structure other than an order. In such situations, the most widely used aggregation functions are the so-called Sugeno integrals, which can be thought of as certain lattice polynomial functions, namely, those which preserve constant tuples.

This observation will be the starting point of our talk. We shall start by presenting axiomatizations of lattice polynomial functions that have natural interpretations in aggregation theory. Then we shall consider certain extensions of polynomial functions that play an important role in decision making, in particular, in preference modeling, and present their characterizations accordingly. As we shall see, these results pave the way towards an axiomatic treatment of qualitative decision making.

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