Mathematics Colloquium Speaker

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Will speak on
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at 4:00 PM
in 331 TMCB

Comparison Meaningful Aggregation Functions: a State of the Art

In many domains we are faced with the problem of aggregating a collection of numerical readings to obtain a mean or typical value. Such an aggregation problem is becoming more and more present in an increasing number of areas, not only of mathematics or physics, but also of engineering, economical, social, and other sciences. Various aggregation functions and processes have already been proposed in the literature and many others are still to be designed to fulfill newer and newer requirements.

Studies on the aggregation problem have shown that the choice of the aggregation function is far from being arbitrary and should be based upon properties dictated by the framework in which the aggregation is performed.

One of the main concerns when choosing an appropriate function is to take into account the scale types of the variables being aggregated. On this issue it was observed that the general form of the aggregation function is greatly restricted if we know the scale types of the dependent and independent variables. For instance, if all the variables define a common ordinal scale, it is clear that any relevant aggregation function cannot be constructed from usual arithmetic operations, unless these operations involve only order. Thus, computing the arithmetic mean is forbidden, whereas the median or any order statistic is permitted.

We present a state of the art survey on the known axiomatizations of aggregation functions mapping ordinal scales into an ordinal scale. We show that, in this ordinal context, the family of possible aggregation functions is rather poor, more or less consisting of order statistics and lattice polynomials.

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