Why Sugeno λ-Measures

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To describe expert uncertainty, it is often useful to go beyond additive probability measures and use non-additive (fuzzy) measures. One of the most widely and successfully used class of such measures is the class of Sugeno λ-measures. Their success is somewhat paradoxical, since from the purely mathematical viewpoint, these measures are – in some reasonable sense – equivalent to probability measures. In this paper, we explain this success by showing that while mathematically, it is possible to reduce Sugeno measures to probability measures, from the computational viewpoint, using Sugeno measures is much more efficient. We also show that among all fuzzy measures equivalent to probability measures, Sugeno measures (and a slightly more general family of measures) are the only ones with this property.