Cominimum Additive Operators

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This paper proposes a class of weak additivity concepts for an operator on the set of real valued functions on a finite state space Ω, which include dditivity and comonotonic additivity as extreme cases. Let $\mathcal{E}$ be a collection of subsets of Ω. Two functions x and y on Ω are $\mathcal{E}$-cominimum if, for each $E \in \mathcal{E}$, the set of minimizers of x restricted on E and that of y have a common element. An operator I on the set of functions on Ω is $\mathcal{E}$-cominimum additive if $I(x + y) = I(x) + I(y)$ whenever x and y are $\mathcal{E}$-cominimum. The main result characterizes homogeneous $\mathcal{E}$-cominimum additive operators in terms of the Choquet integrals and the corresponding non-additive signed measures. As applications, this paper gives an alternative proof for the characterization of the E-capacity expected utility model of Eichberger and Kelsey (1999) and that of the multi-period decision model of Gilboa (1989).