

Intervallwsk und Grundlagen der Statistik

Imprecise Probabilities and Foundations

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Uncertainty as a Multidimensional Concept

- - Complex uncertainty
=
probabilistic uncertainty
+
ambiguity/indeterminacy/Knightian uncertainty
- Imprecision as an additional essential modelling dimension
 - * partial information (incomplete, non-identifying, conflicting, heterogeneous, ambiguous, ...)
 - * reliable conclusions, instead of overprecision based on unjustified additional assumptions

- $$P(A) = \left[\underbrace{\overbrace{\underline{P}(A)}^{\text{non-additive}}, \overbrace{\bar{P}(A)}^{\text{non-additive}}}_{\text{imprecision}} \right], \quad \forall \text{ events } A$$

\iff set of traditional probabilities (credal set, structure)

Some History

- Boole (1854), Koopman (1940), Borel (1940), Smith (1961)
- Ellsberg (1961): decision making under ambiguity, bounded rationality
 - * Kofler & Menges (1976): linear partial information
 - * Gamma-Maximin, Choquet expected utility, coherent risk measures
 - * Kahneman & Tversky: prospect theory
- Dempster (1967-); Shafer (1976): artificial intelligence
- Huber & Strassen (1973): capacities instead of probabilities, robust statistics
- Walley (1991), Kutznezsov (1991), Weichselberger (1991/2001); Shafer & Vovk (2001), Manski (2003),
- 1999– Biannual Symposium: ISIPTA, ISI-indexed full-paper proceedings
- 2002– SIPTA: Society for Imprecise Probability: Theories and Applications,
www.sipta.org

Presentations

- Frank Coolen

Nonparametric predictive inference: overview and recent results

- Uwe Saint-Mont

A contemporary look at the long-lasting frequentist-Bayesian debate

- Gert de Cooman

New developments in credal networks