

Coletti, Giulianella; Scozzafava, Romano; Vantaggi, Barbara

Inferential processes leading to possibility and necessity. (English) Zbl 1320.68181
Inf. Sci. 245, 132-145 (2013).

Summary: This paper deals with the upper and lower bounds of a class of uncertainty measures endowed with particular characteristics (decomposability, monotonicity, partial additivity and so on). We consider an initial partial assessment consistent with either probability or possibility or necessity, then we study the upper and lower envelopes of all possible extensions. By resorting to a notion of weak logical independence we get as lower or upper envelope a possibility or a necessity, respectively, starting either from a probability or from a possibility or from a necessity.

MSC:

68T37 Reasoning under uncertainty in the context of artificial intelligence

Cited in 17 Documents

Keywords:

coherent probability; possibility; weak logical independence; upper and lower envelope

Full Text: [DOI](#)

References:

- [1] Baiocchi, M.; Capotorti, A.; Tulipani, S.; Vantaggi, B., Simplification rules for the coherent probability assessment problem, *Ann. Math. Art. Intell.*, 35, 11-28, (2002) · [Zbl 1006.68128](#)
- [2] Baiocchi, M.; Coletti, G.; Petturiti, D.; Vantaggi, B., Inferential models and relevant algorithms in a possibilistic framework, *Int. J. Approx. Reason.*, 52, 5, 580-598, (2011) · [Zbl 1214.68393](#)
- [3] Baiocchi, M.; Petturiti, D., Algorithms for possibility assessments: coherence and extension, *Fuzzy Sets Syst.*, 169, 1, 1-25, (2011) · [Zbl 1214.68394](#)
- [4] Baroni, P.; Vicig, P., An uncertainty interchange format with imprecise probabilities, *Int. J. Approx. Reason.*, 40, 3, 147-180, (2005) · [Zbl 1110.68145](#)
- [5] V. Biazzo, A. Gilio, G. Sanfilippo, Coherent conditional previsions and proper scoring rules, in: *Advances in Computational Intelligence - IPMU 2012, CCIS*, 300, 2012, pp. 146-156. · [Zbl 1252.62006](#)
- [6] Coletti, G.; Scozzafava, R., The role of coherence in eliciting and handling imprecise probabilities and its application to medical diagnosis, *Inform. Sci.*, 130, 41-65, (2000) · [Zbl 0984.68155](#)
- [7] Coletti, G.; Scozzafava, R., Probabilistic logic in a coherent setting, *Trends in Logic*, vol. 15, (2002), Kluwer Academic Publishers Dordrecht, Boston, London · [Zbl 1005.60007](#)
- [8] Coletti, G.; Scozzafava, R., Toward a general theory of conditional beliefs, *Int. J. Intel. Syst.*, 21, 229-259, (2006) · [Zbl 1160.68582](#)
- [9] G. Coletti, R. Scozzafava, B. Vantaggi, Possibility measures through a probabilistic inferential process, in: *NAFIPS 2008 Annual Meeting of the North Am. Fuzzy Inform. Proc. Society*, 2008, pp. 1-6.
- [10] Coletti, G.; Scozzafava, R.; Vantaggi, B., Possibility measures in probabilistic inference, (Dubois, D.; Lubiano, M.; Prade, H.; Gil, M.; Grzegorzewski, P.; Hryniewicz, O., *Soft Methods for Handling Variability and Imprecision, Advances in Soft Computing*, vol. 48, (2008), Springer Berlin/Heidelberg), 51-58
- [11] Coletti, G.; Vantaggi, B., Representability of ordinal relations on a set of conditional events, *Theory Decis.*, 60, 137-174, (2006) · [Zbl 1119.91029](#)
- [12] Coletti, G.; Vantaggi, B., T -conditional possibilities: coherence and inference, *Fuzzy Sets Syst.*, 160, 3, 306-324, (2008) · [Zbl 1178.60006](#)
- [13] De Cooman, G.; Aeyels, D., Supremum-preserving upper probabilities, *Inform. Sci.*, 118, 173-212, (1999) · [Zbl 0952.60009](#)
- [14] de Cooman, G.; Troffaes, M.; Miranda, E., n -monotone lower previsions, *J. Intell. Fuzzy Syst.*, 16, 4, 253-263, (2005)
- [15] de Finetti, B., *Teoria della probabilità*, vols. I, II, (1970), Einaudi Torino, (Engl. Transl. (1974) *Theory of probability*, Wiley & Sons, London)
- [16] de Finetti, B., Sul significato soggettivo Della probabilità, (de Finetti, B.; Monari, P.; Cocchi, D., *Induction and Probability*, Engl. Transl., (1993), CLUEB Bologna), 17, 291-321, (1931) · [Zbl 57.0608.07](#)
- [17] Dempster, A. P., Upper and lower probabilities induced by a multivalued mapping, *Ann. Math. Stat.*, 38, 2, 325-339, (1967) · [Zbl 0168.17501](#)

- [18] Destercke, S.; Dubois, D., Idempotent conjunctive combination of belief functions: extending the minimum rule of possibility theory, *Inform. Sci.*, 181, 18, 3925-3945, (2011) · [Zbl 1242.68324](#)
- [19] Dubois, D., Possibility theory and statistical reasoning, *Comput. Stat. Data Anal.*, 51, 1, 47-69, (2006) · [Zbl 1157.62309](#)
- [20] D. Dubois, Fuzzy measures on finite scales as families of possibility measures, in: *Proc. EUSFLAT 2011*, 2011, pp. 822-829. · [Zbl 1254.28017](#)
- [21] Dubois, D.; Prade, H., Upper and lower possibilities induced by a multivalued mapping, (Sanchez, E., *Proc. IFAC Symp. on Fuzzy Infor., Knowledge Representation and Decision Analysis, Marseille, (1984/1983)*, Pergamon Press Oxford), 147-152
- [22] Dubois, D.; Prade, H., Evidence measures based on fuzzy information, *Automatica*, 21, 547-562, (1985) · [Zbl 0596.62007](#)
- [23] Dubois, D.; Prade, H., Fuzzy sets and statistical data, *Eur. J. Operat. Res.*, 25, 3, 345-356, (1986) · [Zbl 0588.62002](#)
- [24] Dubois, D.; Prade, H., When upper probabilities are possibility measures, *Fuzzy Sets Syst.*, 49, 65-74, (1992) · [Zbl 0754.60003](#)
- [25] Fagin, R.; Halpern, J., Uncertainty, belief and probability, *Comput. Intell.*, 7, 160-173, (1991)
- [26] Gilio, A., Generalizing inference rules in a coherence-based probabilistic default reasoning, *Int. J. Approx. Reason.*, 53, 3, 413-434, (2012) · [Zbl 1242.68330](#)
- [27] Grabisch, M., k -order additive discrete fuzzy measures and their representation, *Fuzzy Sets Syst.*, 92, 2, 167-189, (1997) · [Zbl 0927.28014](#)
- [28] Halpern, J., *Reasoning about uncertainty*, (2003), The MIT Press · [Zbl 1090.68105](#)
- [29] Mesiar, R., k -order additivity and maxitivity, *Atti Sem. Mater. Fis. Univ. Modena*, 51, 1, 179-189, (2003) · [Zbl 1220.28001](#)
- [30] Mesiar, R., A note on de finetti's lower probabilities and belief measures, *Rend. Mater. Appl.*, 28, 7, 229-235, (2008) · [Zbl 1170.68610](#)
- [31] Miranda, E.; de Cooman, G.; Couso, I., Lower previsions induced by multivalued mappings, *J. Stat. Plan. Inform.*, 133, 1, 173-197, (2005) · [Zbl 1101.68868](#)
- [32] H. Prade, A. Rico, Possibilistic evidence, in: *Proc. ECSQARU 2011, LNCS 6717*, 2011, pp. 713-724. · [Zbl 1341.68263](#)
- [33] Shafer, G., *A mathematical theory of evidence*, (1976), Princeton Univ. Press · [Zbl 0359.62002](#)
- [34] Shapley, L. S., Cores of convex games, *Int. J. Game Theory*, 1, 11-26, (1971) · [Zbl 0222.90054](#)
- [35] Tshiporkova, E.; De Baets, B., A general framework for upper and lower possibilities and necessities, *Int. J. Unc., Fuzziness Knowledge-Based Syst.*, 6, 1, 1-34, (1998) · [Zbl 1065.03510](#)
- [36] Walley, P., *Statistical reasoning with imprecise probabilities*, (1991), Chapman and Hall London · [Zbl 0732.62004](#)
- [37] Zadeh, L. A., Toward a generalized theory of uncertainty (GTU) - an outline, *Inform. Sci.*, 172, 1-40, (2005) · [Zbl 1074.94021](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.