

Coletti, Giulianella; Petturiti, Davide**Finitely maxitive conditional possibilities, Bayesian-like inference, disintegrability and conglomerability.** (English) Zbl 1383.62060

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Summary: The aim of the paper is to study Bayesian-like inference processes involving coherent finitely maxitive T -conditional possibilities assessed on infinite sets of conditional events. Coherence of an assessment consisting of an arbitrary possibilistic prior and an arbitrary possibilistic likelihood function is proved, thus a closed form expression for the envelopes of the relevant joint and posterior possibilities is given when T is the minimum or a strict t-norm. The notions of disintegrability and conglomerability are also studied and their relevance in the infinite version of the possibilistic Bayes formula is highlighted.

MSC:

62F15 Bayesian inference
60A05 Axioms; other general questions in probability
62F86 Parametric inference and fuzziness

Cited in 6 Documents

Keywords:

Bayesian-like inference; disintegrability; conglomerability; finite maxitivity; T -conditional possibility; possibilistic likelihood function; coherence

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- [1] Armstrong, T. E., Conglomerability of probability measures on Boolean algebras, *J. Math. Anal. Appl.*, 150, 2, 335-358, (1990) · [Zbl 0714.28004](#)
- [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] Berti, P.; Rigo, P., Weak disintegrability as a form of preservation of coherence, *J. Ital. Stat. Soc.*, 1, 2, 161-181, (1992) · [Zbl 1446.60003](#)
- [5] Bouchon-Meunier, B.; Coletti, G.; Marsala, C., Conditional possibility and necessity, (Bouchon-Meunier, B.; Gutiérrez-Ríos, J.; Magdalena, L.; Yager, R. R., *Technologies for Constructing Intelligent Systems 2, Studies in Fuzziness and Soft Computing*, vol. 90, (2002), Physica-Verlag HD), 59-71 · [Zbl 1015.68191](#)
- [6] Bouchon-Meunier, B.; Coletti, G.; Marsala, C., Independence and possibilistic conditioning, *Ann. Math. Artif. Intell.*, 35, 1-4, 107-123, (2002) · [Zbl 1004.60001](#)
- [7] Cifarelli, D. M.; Regazzini, E., De Finetti's contribution to probability and statistics, *Stat. Sci.*, 11, 4, 253-282, (1996) · [Zbl 0955.01552](#)
- [8] Coletti, G.; Petturiti, D.; Vantaggi, B., Bayesian inference: the role of coherence to deal with a prior belief function, *Stat. Methods Appl.*, 23, 4, 519-545, (2014)
- [9] Coletti, G.; Petturiti, D.; Vantaggi, B., Coherent T -conditional possibility envelopes and nonmonotonic reasoning, (Laurent, A.; Strauss, O.; Bouchon-Meunier, B.; Yager, R. R., *Information Processing and Management of Uncertainty in Knowledge-Based Systems, Communications in Computer and Information Science*, vol. 444, (2014), Springer International Publishing), 446-455
- [10] Coletti, G.; Petturiti, D.; Vantaggi, B., Possibilistic and probabilistic likelihood functions and their extensions: common features and specific characteristics, *Fuzzy Sets Syst.*, 250, 25-51, (2014) · [Zbl 1334.60004](#)
- [11] Coletti, G.; Scozzafava, R., From conditional events to conditional measures: a new axiomatic approach, *Ann. Math. Artif. Intell.*, 32, 1-4, 373-392, (2001) · [Zbl 1314.68306](#)
- [12] Coletti, G.; Scozzafava, R., Probabilistic logic in a coherent setting, *Trends in Logic*, vol. 15, (2002), Kluwer Academic Publisher Dordrecht/Boston/London · [Zbl 1005.60007](#)
- [13] Coletti, G.; Vantaggi, B., Possibility theory: conditional independence, *Fuzzy Sets Syst.*, 157, 11, 1491-1513, (2006) · [Zbl 1092.68094](#)

- [14] Coletti, G.; Vantaggi, B., T-conditional possibilities: coherence and inference, *Fuzzy Sets Syst.*, 160, 3, 306-324, (2009) · [Zbl 1178.60006](#)
- [15] De Baets, B.; Tsiporkova, E.; Mesiar, R., Conditioning in possibility theory with strict order norms, *Fuzzy Sets Syst.*, 106, 2, 221-229, (1999) · [Zbl 0985.28015](#)
- [16] de Cooman, G., Possibility theory I: the measure- and integral-theoretic groundwork, *Int. J. Gen. Syst.*, 25, 291-323, (1997) · [Zbl 0955.28012](#)
- [17] de Cooman, G., Possibility theory II: conditional possibility, *Int. J. Gen. Syst.*, 25, 4, 325-351, (1997) · [Zbl 0955.28013](#)
- [18] de Cooman, G., Integration and conditioning in numerical possibility theory, *Ann. Math. Artif. Intell.*, 32, 1-4, 87-123, (2001) · [Zbl 1314.28012](#)
- [19] de Cooman, G.; Kerre, E. E., Possibility and necessity integrals, *Fuzzy Sets Syst.*, 77, 2, 207-227, (1996) · [Zbl 0872.28010](#)
- [20] de Finetti, B., Sulla proprietà conglomerativa delle probabilità subordinate, *Atti R. Accad. Naz. Lincei, Ser. VI, Rend.*, 12, 278-282, (1930) · [Zbl 56.0445.02](#)
- [21] de Finetti, B.; de Finetti, B., Aggiunta alla nota sull'assiomatica Della probabilità, *Ann. Triest., Ann. Triest.*, 20, 3-20, (1949) · [Zbl 0044.13402](#)
- [22] de Finetti, B., *Probability, induction and statistics: the art of guessing*, (1972), John Wiley & Sons London, New York, Sydney, Toronto · [Zbl 0275.60001](#)
- [23] Dempster, A. P., Upper and lower probabilities induced by a multivalued mapping, *Ann. Math. Stat.*, 38, 2, 325-339, (1967) · [Zbl 0168.17501](#)
- [24] Dubins, L. E., Finitely additive conditional probabilities, conglomerability and disintegrations, *Ann. Probab.*, 3, 1, 89-99, (1975) · [Zbl 0302.60002](#)
- [25] Dubois, D.; Prade, H., *Possibility theory: an approach to computerized processing of uncertainty*, (1988), Plenum Press New York and London
- [26] El Rayes, A. B.; Morsi, N. N., Generalized possibility measures, *Inf. Sci.*, 79, 3-4, 201-222, (1994) · [Zbl 0812.28012](#)
- [27] Hisdal, E., Conditional possibilities independence and noninteraction, *Fuzzy Sets Syst.*, 1, 4, 283-297, (1978) · [Zbl 0393.94050](#)
- [28] Klement, E. P.; Mesiar, R.; Pap, E., *Triangular norms*, vol. 8, (2000), Kluwer Academic Publisher Dordrecht/Boston/London
- [29] Miranda, E.; Zaffalon, M.; de Cooman, G., Conglomerable natural extension, *Int. J. Approx. Reason.*, 53, 8, 1200-1227, (2012) · [Zbl 1287.60006](#)
- [30] Petturiti, D., *Coherent conditional possibility theory and possibilistic graphical modeling in a coherent setting*, (2013), Università degli Studi di Perugia Perugia, Italy, PhD thesis
- [31] Regazzini, E., De Finetti's coherence and statistical inference, *Ann. Stat.*, 15, 2, 845-864, (1987) · [Zbl 0653.62003](#)
- [32] Schervish, M. J.; Seidenfeld, T.; Kadane, J. B., The extent of non-conglomerability of finitely additive probabilities, *Z. Wahrscheinlichkeitstheor. Verw. Geb.*, 66, 205-226, (1984) · [Zbl 0525.60003](#)
- [33] Scozzafava, R., Probabilità σ -additive e non, *Boll. UMI*, 1-A, 6, 1-3, (1982) · [Zbl 0484.60003](#)
- [34] Seidenfeld, T.; Schervish, M. J.; Kadane, J. B., Non-conglomerability for finite-valued, finitely additive probability, *Special Issue on Bayesian Analysis, Indian J. Stat., A*, 60, 476-491, (1998) · [Zbl 0978.60005](#)
- [35] Shilkret, N., Maxitive measure and integration, *Indag. Math. (Proc.)*, 74, 109-116, (1971) · [Zbl 0218.28005](#)
- [36] Sugeno, M., *Theory of fuzzy integrals and its applications*, (1974), Tokyo Institute of Technology Tokyo, Japan, PhD thesis
- [37] Walley, P., *Statistical reasoning with imprecise probabilities*, (1991), Chapman and Hall London · [Zbl 0732.62004](#)
- [38] Walley, P.; de Cooman, G., Coherence of rules for defining conditional possibility, *Int. J. Approx. Reason.*, 21, 1, 63-107, (1999) · [Zbl 0957.68115](#)
- [39] Weber, S., \boxtimes -decomposable measures and integrals for Archimedean t-conorms \boxtimes , *J. Math. Anal. Appl.*, 101, 1, 114-138, (1984) · [Zbl 0614.28019](#)
- [40] Weber, S., Two integrals and some modified versions - critical remarks, *Fuzzy Sets Syst.*, 20, 1, 97-105, (1986) · [Zbl 0595.28012](#)
- [41] Zadeh, L. A., Fuzzy sets as a basis for a theory of possibility, *Fuzzy Sets Syst.*, 1, 1, 3-28, (1978) · [Zbl 0377.04002](#)

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