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# International Journal of Approximate Reasoning

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## Editorial

This special issue contains selected papers from the International Workshop on the Theory of Belief Functions (BELIEF 2010), which was held in April 2010 in Brest, France. This was the first edition of a biennial series of conferences that will be organized alternately with a spring school on the same topic. The next edition will take place in Compiègne, France, on 9–11 May, 2012. The BELIEF conferences will provide an international forum for the presentation and discussion of research trends on the theory of belief functions, also referred to as “Dempster–Shafer theory”. This theory was first introduced by Arthur P. Dempster in the context of statistical inference and was later developed by Glenn Shafer as a general framework for modeling epistemic uncertainty. These seminal contributions have been the starting points of many important developments, including Smets’ transferable belief model and the theory of hints. The theory of belief functions is now well established as a general framework for reasoning with uncertainty and has well understood connections with other frameworks such as probability, possibility and imprecise probability theories.

Out of the 48 papers presented at the workshop, seven extended papers were invited for this special issue. Five high-quality contributions have been finally accepted after two rounds of review by three referees.

The paper “Distances in evidence theory: Comprehensive survey and generalizations” proposes a survey of dissimilarity measures used in the theory of belief functions. The main contribution is the analytical and quantitative comparison of these measures. Practically, the paper provides guidelines as to how to choose more appropriate measures for a given application.

Two papers deal with the problem of taking into account finer metaknowledge on the reliability of a source than allowed by Shafer’s classical discounting. In the paper “Belief Functions Contextual Discounting and Canonical Decompositions”, the authors consider the situation where the reliability of a source can be expected to depend on the true answer to the question of interest. It extends a previous proposal by one of the authors, where the reliability of a source was expected to depend on different contexts that formed a partition of the frame of discernment. In “Relevance and Truthfulness in Information Correction and Fusion”, the authors consider a metaknowledge about the source called relevance and truthfulness. They introduce a new correcting scheme that generalizes the discounting operation and a new extension of Dempster’s rule.

The paper “Constructing and Evaluating Alternative Frames of Discernment” addresses the problem of combining pieces of information defined over heterogeneous frames of discernment. An automatic method for constructing global frames of discernment is proposed.

The paper “Auditors’ Evidence Evaluation and Aggregation Using Beliefs and Probabilities Comparing Audit Assessments Using Probabilities and Belief Functions” deals with the practical problem of belief function elicitation from experts. There are very few empirical studies about this central problem. More precisely, the authors study whether auditors’ assessments of risk in a financial audit situation under the belief function framework are different from assessments carried out within the probabilistic framework. They show that the formal framework used to express risk may influence the conclusions drawn by the auditors.

## Acknowledgements

The editors wish to express their gratitude to T. Denoeux for hosting this Special Issue.

We also thank the reviewers of the papers in this special issue for their careful and prompt reviews of these papers. They helped the authors to improve substantially the quality of their papers.

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Available online 19 September 2011