

Workshop on the Theory of Belief Functions

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Tutorial

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Knowledge Propagation in Information Fusion Processes

Alain Appriou

ONERA, BP 72, 92322 CHATILLON CEDEX, France

Tel: +33 1 46 73 49 19, Fax: +33 1 46 73 41 63

Email: Alain.Appriou@onera.fr

Information systems have to process more and more disparate complementary sources in an efficient way, in order to face the increased complexity of environments and requirements. Therefore they have to deal with individual beliefs expressed on heterogeneous frames of discernment that may have with each other uncertain or imprecise relations, so that it becomes unsuitable to look for a common one as usually proposed by classical data fusion theories. To face this context, the ability of the belief function theories to propagate knowledge from one frame of discernment to another is emphasized on the basis of a generic operator named "extension". Furthermore, the latter provides a general formulation of the different operators that constitute a complete and coherent processing of multiple uncertain observations, from their modeling up to the required decision making. Therefore the particular conditions that lead to the traditional operators can be specified, in order to provide a federative view of recent developments about sensitive problems faced in the framework of the uncertainty theories, such as information unreliability, source conflict, or adaptive decision making, for instance. The implementation of the generic operator is described, and a few examples illustrate a suitable management of uncertainty processing thanks to available tools.

