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Abstract

Laryea, R. 2018. A data-driven decision support system for coherency of experts' judgment in complex classification problems. The case of food security as a UN sustainable development goal. *Dalarna Doctoral Dissertations* 8. Borlänge: Högskolan Dalarna. ISBN 978-91-85941-79-7.

Everyday humans need to make individual or collective decisions. Often the decisions aim at achieving multiple goals (thus involving multiple criteria) and rely on the decision maker(s)' intuition, internal data, as well as external sources of data. Faced with a complex decision problem of this kind, it is a great challenge to decisionmakers to be logically coherent over time with regard to their preferences. To aid in achieving coherency, operation researchers and decision analysts have developed formal methods to support decision makers. One such method is the UTADIS method that serves as the workhorse for this thesis. I received the request from UN officials who had to manage the sustainable development goals while addressing the issue of food security. They wished for a decision support system (DSS) that could aid in their classification of countries to mitigate the risk of failing on food security. The virtue of the DSS should be that their expert judgment was complemented by formal methods for better risk classification. The UTADIS method was fitting for the purpose, but it lacked implementability. In particular, it required an iterative approach engaging the experts multiple times, while not readily lending itself to making use of external data, making it inefficient as a DSS. The fundamental contribution of this thesis is that I have solved these shortcomings of the UTADIS method, such that it now readily can be used in a functionally efficient way for the desired purpose of the UN. In solving these problems, it is also more broadly implementable as a DSS, as I have validated the artifact to a DSS, by use of several demonstrations and exposed it to sensitivity analysis.

Keywords: Coherence, Efficiency, Decision Support System, Multi-Criteria, Risk, Classification Model, Decision Makers, Judgment, Alternatives, Prediction, Data, Integrate, Imprecision, Food Security, UTADIS

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