

Dissertation abstract

Title: Cross-entropy based combination of discrete probability distributions for distributed decision making

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Abstract: In this work we propose a systematic way to combine discrete probability distributions based on decision making theory and theory of information, namely the cross-entropy (also known as the Kullback-Leibler (KL) divergence). The optimal combination is a probability mass function minimizing the conditional expected KL-divergence. The expectation is taken with respect to a probability density function also minimizing the KL divergence under problem-reflecting constraints. Although the combination is derived for the case when sources provided probabilistic type of information on the common support, it can be applied to other types of given information by proposed transformation and/or extension. The discussion regarding proposed combining and sequential processing of available data, duplicate data, influence of the results by preferences among sources of information and application on real data are also included.

Keywords: distributed decision making, Kullback-Leibler divergence, minimum cross-entropy principle.