

A Fractal Belief KL Divergence

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Abstract

In this paper, a novel symmetric fractal-based belief KL divergence is proposed to more appropriately measure the conflict between BPAs.

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1. The proposed method

Definition. (Symmetric fractal-based belief KL divergence measure)

Let m_1 and m_2 be two belief functions in the frame of discernment Θ . The symmetric fractal-based belief KL divergence $FBD_{SKL}(m_1, m_2)$ is defined as:

$$FBD_{SKL}(m_1, m_2) = \frac{1}{2} \sum_{i=1}^{2^n-1} \left[m_{F_1}(H_i) \log \frac{m_{F_1}(H_i)}{\sqrt{m_{F_1}(H_i) \times m_{F_2}(H_i)}} + m_{F_2}(H_i) \log \frac{m_{F_2}(H_i)}{\sqrt{m_{F_2}(H_i) \times m_{F_1}(H_i)}} \right],$$

where $m_{F_k}(H_i)$ is based on fractal process and is defined as:

$$m_{F_k}(H_i) = \sum_{H_i \subseteq G_i} \frac{m_k(G_i)}{2^{|G_i|} - 1},$$

where $H_i, G_i \subseteq \Theta$.

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