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Executive Summary

Assignment of Basic Probability with Logarithmic Negation

Shaukat Ali Khan

An important area in artificial intelligence and machine learning is information fusion at the level of decision-making. It can significantly enhance a system's ability to make decisions. The issue is how to effectively combine this knowledge in the face of complex, unreliable, erroneous, and incomplete data to get more logical answers. The logarithmic negation of BPA is a new negation that this research suggests. It addresses Yin's argument that when there are just two focus elements in the BPA, maximal entropy cannot be reached. The order reversal, involution, convergence, degeneration, and maximal entropy of the negation of probability are all nice qualities that the logarithmic negation of BPA inherits.

D-S evidence theory is an expansion of possibility theory with more precise information expression and improved information processing. The denial of BPA presents the opposing side of the information and offers a fresh way to think about information processing. The best way to rationally negate BPA is still up for debate. To solve the limitation of Yin's negation that the maximal entropy cannot be attained when there are only two focal components in the BPA, a novel negation of BPA known as the logarithmic negation was devised. The order reversal, involution, convergence, degeneration, and maximal entropy of the negation of probability are all nice qualities that the logarithmic negation of BPA inherits.

When all the values of the elements are close to 0, the logarithmic negation degenerates into the Gao's negation. Entropy can rise because of the logarithmic negation operation, and the FOD's element size has an impact on how quickly convergence occurs. For study and verification, a few numerical examples were provided. Finally, in two target recognition applications, the data fusion method based on logarithmic negation had the greatest belief value of the correct target.

Source: Information

KEYWORDS

logarithmic negation; negation of basic probability assignment; uncertainty; Dempster–Shafer evidence theory; target recognition