

SCI22 – Combination of evidence

Exercises

Exercise 1

Let m_1 and m_2 be two mass functions on $\Omega = \{a, b, c, d\}$ defined as follows

$$m_1(\{a\}) = 0.3 \quad m_1(\{a, c\}) = 0.5 \quad m_1(\{b, c, d\}) = 0.2$$

and

$$m_2(\{b, c\}) = 0.4 \quad m_2(\{a, c, d\}) = 0.5 \quad m_2(\{d\}) = 0.1.$$

Compute the combined mass functions using different combination operators.

Exercise 2

Let m be a mass function on Ω and B a non-empty subset of Ω .

1. Express the conditional belief function $Bel(\cdot|B)$ as a function of Bel .
2. What does this formula become when Bel is a probability measure?

Exercise 3

Let m_1 and m_2 be two consonant mass functions, and let Pl_1 and Pl_2 be the corresponding plausibility measures.

1. Show that $Pl_1 \vee Pl_2 = \max(Pl_1, Pl_2)$ is a plausibility measure.
2. What are the properties of this operator?
3. Using a counterexample, show that $Pl_1 \vee Pl_2$ may not be a plausibility measure when m_1 and m_2 are not consonant.