Replacing the Conjunctive Rule and Disjunctive Rule with T-norms and T-conorms respectively (Tchamova-Smarandache):

A **T-norm** is a function $T_n: [0, 1]^2 \rightarrow [0, 1]$, defined in fuzzy/neutrosophic set theory and fuzzy/neutrosophic logic to represent the “intersection” of two fuzzy/neutrosophic sets and the fuzzy/neutrosophic logical operator “and” respectively. Extended to the fusion theory the T-norm will be a substitute for the conjunctive rule.

The T-norm satisfies the conditions:

a) Boundary Conditions: $T_n(0, 0) = 0$, $T_n(x, 1) = x$.

b) Commutativity: $T_n(x, y) = T_n(y, x)$.

c) Monotonicity: If $x \leq u$ and $y \leq v$, then $T_n(x, y) \leq T_n(u, v)$.

d) Associativity: $T_n(T_n(x, y), z) = T_n(x, T_n(y, z))$.

There are many functions which satisfy the T-norm conditions. We present below the most known ones:

**The Algebraic Product T-norm:**

$T_{n\text{-algebraic}}(x, y) = x \cdot y$

**The Bounded T-norm:**

$T_{n\text{-bounded}}(x, y) = \max\{0, x+y-1\}$

**The Default (min) T-norm (introduced by Zadeh):**

$T_{n\text{-min}}(x, y) = \min\{x, y\}$.

Min rule can be interpreted as an optimistic lower bound for combination of bba and the below Max rule as a prudent/pessimistic upper bound. (Jean Dezert)

A **T-conorm** is a function $T_c: [0, 1]^2 \rightarrow [0, 1]$, defined in fuzzy/neutrosophic set theory and fuzzy/neutrosophic logic to represent the “union” of two fuzzy/neutrosophic sets and the fuzzy/neutrosophic logical operator “or” respectively. Extended to the fusion theory the T-conorm will be a substitute for the disjunctive rule.

The T-conorm satisfies the conditions:

a) Boundary Conditions: $T_c(1, 1) = 1$, $T_c(x, 0) = x$.

b) Commutativity: $T_c(x, y) = T_c(y, x)$.

c) Monotonicity: if $x \leq u$ and $y \leq v$, then $T_c(x, y) \leq T_c(u, v)$.

d) Associativity: $T_c(T_c(x, y), z) = T_c(x, T_c(y, z))$.

There are many functions which satisfy the T-conorm conditions. We present below the most known ones:

**The Algebraic Product T-conorm:**

$T_{c\text{-algebraic}}(x, y) = x+y-x \cdot y$

**The Bounded T-conorm:**

$T_{c\text{-bounded}}(x, y) = \min\{1, x+y\}$

**The Default (max) T-conorm (introduced by Zadeh):**

$T_{c\text{-max}}(x, y) = \max\{x, y\}$.

Then, the T-norm Fusion rule is defined as follows:

$m_{\cap}^{\Theta}(A) = \sum_{X,Y \in \Theta} T_n(ml(X), m2(Y))$

and the T-conorm Fusion rule is defined as follows:
m_{\sqcup\sqcap} (A) = \sum_{X, Y \in \Theta} Tc(ml(X), m2(Y))

The T-norms/conorms are commutative, associative, isotone, and have a neutral element.

Florentin Smarandache