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Interval Valued Fuzzy Sets and Measures

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***Abstract*— Three classes of connectives generate three classes of interval valued fuzzy sets due to a separation between the disjunctive and conjunctive normal forms. The three classes are identified by the axiomatic conditions, These are:**

(i) boundary, monotonicity and involutive complementation;

(ii) conditions in (i) plus commutativity and associativity; and

(iii) conditions in (ii) plus idempotency.

Furthermore, the selection of a particular involutive complement together with some crisp disjunction and conjunction results in a new interpretation of the classical laws such as "Excluded Middle", "Contradiction", "Equivalence", etc. These laws must now be interpreted as "a matter of degree". That is, we ought not state, for example, that the "Law of Excluded Middle" holds or not, but rather that it holds to a degree that is generated for a given membership value.

Finally, one can introduce fuzzy measures over the interval valued fuzzy sets, such as "non-specificity", "belief", etc. These measures provide a new direction for evidential reasoning.

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