

## An Example of Applications of Intuitionistic Fuzzy Sets to Sociometry

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**Abstract:** *In [2] a method of a sociometric questionnaire has been developed for identifications of the social status of a pupil in a school class. In the present paper the method is described by a simple way using the Atanassov sets (IF sets) from [1].*

**Keywords:** *Intuitionistic fuzzy set, Sociometry.*

### 1. Sociometric questionnaire

Every pupil obtains questionnaire. He have to write to every name the sign + (accept) or – (nonaccept) or nothing. So, for every pupil  $x$  two numbers are obtained;

$$\begin{aligned} A(x) &= \text{number of accepts,} \\ N(x) &= \text{number of non-accepts.} \end{aligned}$$

In both cases also zero can be obtained. In [2] two indexes are considered

$$I_1(x) = \frac{A(x)}{N(x)}, \text{ if } A(x) \geq N(x), N(x) \neq 0,$$

$$I_2(x) = -\frac{N(x)}{A(x)}, \text{ if } N(x) \geq A(x), A(x) \neq 0.$$

Since division is more pretended operation as intersection the result of the method [2] can be described by following implications

$$A(x) > N(x) \Rightarrow I(x) = \frac{A(x)}{n},$$

$$A(x) = N(x) \Rightarrow I(x) = 0,$$

$$A(x) < N(x) \Rightarrow I(x) = -\frac{N(x)}{n},$$

where  $n$  is the number of pupils in the class considered.

## 2. IF-sets

An IF-set is a pair of mappings

$$\mu : X \rightarrow [0, 1], \nu : X \rightarrow [0, 1]$$

such that

$$\mu(x) + \nu(x) \leq 1$$

for any  $x \in X$ . In our case  $X$  is the set of all pupils in the considered class. If  $A(x)$  is the number of acceptance of the pupil  $x$  (hence  $A(x) \in \{0, 1, \dots, n\}$  where  $n$  is the number of pupils in the class), then we put

$$\mu(x) = \frac{A(x)}{n}.$$

Similarly

$$\nu(x) = \frac{N(x)}{n},$$

where  $N(x)$  is the numbers of non-acceptation of the pupil  $x$ . Since

$$A(x) + N(x) \leq n,$$

we obtain

$$\mu(x) + \nu(x) = \frac{A(x)}{n} + \frac{N(x)}{n} \leq 1,$$

hence the pair  $(\mu, \nu)$  is an example of an IF-set. The index of acceptance of  $x$  can be described by the formulas

$$I(x) = \mu(x), \text{ if } A(x) \geq N(x),$$

$$I(x) = -\nu(x), \text{ if } A(x) < N(x),$$

or simply

$$I(x) = \mu(x) - \nu(x), x \in X.$$

So, we obtain the following simple algorithms

$$\mu(x) = \frac{A(x)}{n}, \nu(x) = \frac{N(x)}{n},$$

$$I(x) = \mu(x) - \nu(x).$$

On the other hand an interesting example of an IF set is obtained using this approach (Fig 1.).

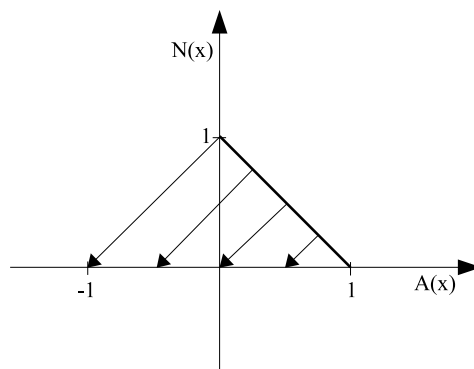


Fig. 1

### 3. Conclusion

The method of scrutinizing pupil's social status by means of sociometric questionnaire is described in the paper by a very simple rule. The description gives an interesting example of an Atanassov IF set.

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