ON THE GEOMETRICAL INTERPRETATIONS OF THE INTUITIONISTIC FUZZY LOGICAL OBJECTS. Part 1.

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Following the ideas from [1] we shall introduce a second geometrical interpretation of the Intuitionistic Fuzzy Logical (IFL-) objects (see e.g. [2-4]).

Let a set S of propositions be fixed. Let the truth-valued function V be defined as follows. For $p \in S$:

$$V(p) = \langle \mu(p), \nu(p) \rangle,$$

where the functions $\mu: S \to [0, 1]$ and $\nu: S \to [0, 1]$ define the degrees of validity and of non-validity and

$$0 \leq \mu(p)^2 + \nu(p)^2 \leq 1.$$

Obviously, in the case of the ordinary fuzzy logic it is valid that:

$$V(p) = \langle \mu(p), \sqrt{1 - \mu(p)^2} \rangle.$$

If

$$\pi_A(x) = \sqrt{1 - \mu_A(x)^2 - \nu_A(x)^2},$$

then $\pi(x)$ is the degree of indeterminacy of the proposition p.

In the case of the ordinary fuzzy logic, $\pi(p) = 0$ for every $p \in S$.

Obviously, for all real numbers $a, b \in [0, 1]$, if

$$0 \leq a + b \leq 1$$

then

$$0 \leq a^2 + b^2 \leq 1.$$

Hence for the newly generated function V, more of the above defined operations, relations and operators will be valid. Thus we shall discuss only some of the geometrical interpretations of the IFL-objects.

Contrary ot the first geometrical interpretation of the IFL-objects (see [5]), the new geometrical interpretation has the form shown in Fig. 1.

Let the interpretation (evaluation) function is noted with W, where $W : S \to F'$.

Here, the inequality

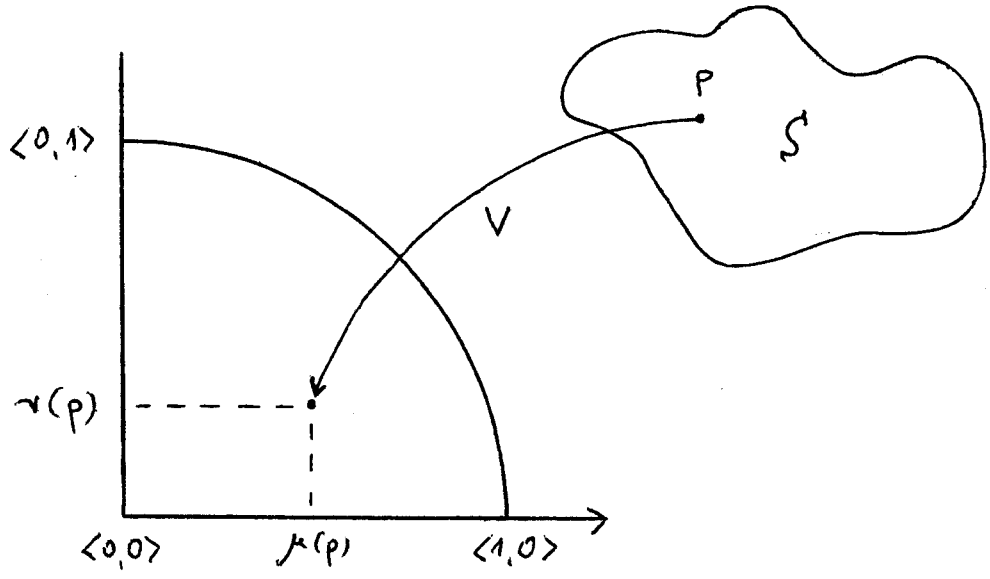

Fig. 1

$$0 \leq a + b \leq 1$$

between the coordinates <a, b> of the point $V(p) \in F$ is changed to the inequation

$$0 \leq a^2 + b^2 \leq 1$$

between the coordinates <a, b> of the point $W(p) \in F'$.

Below we shall show the geometrical interpretation of the operators $\Box$, $\Diamond$, D_α and $F_{\alpha,\beta}$ (see Fig. 2-5, respectively) because the geometrical interpretation of the other operators and of the operations over the IFL-objects are almost identical with the above ones and with these from [5] and the differentce is only in the form of the figure F'.

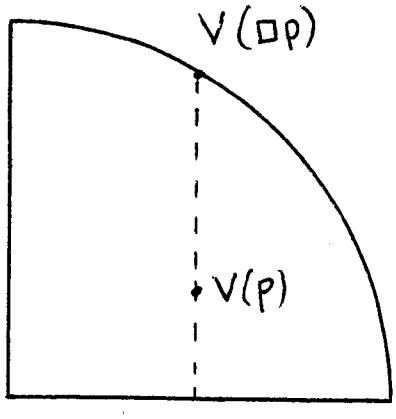

Fig. 2

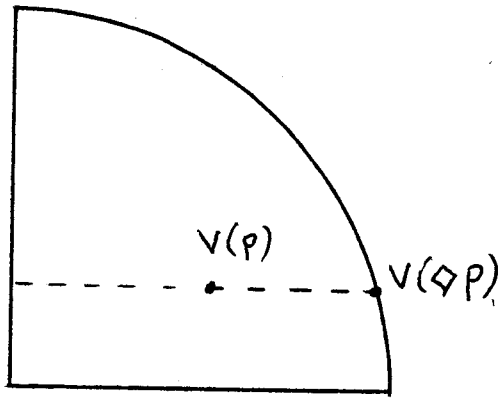

Fig. 3

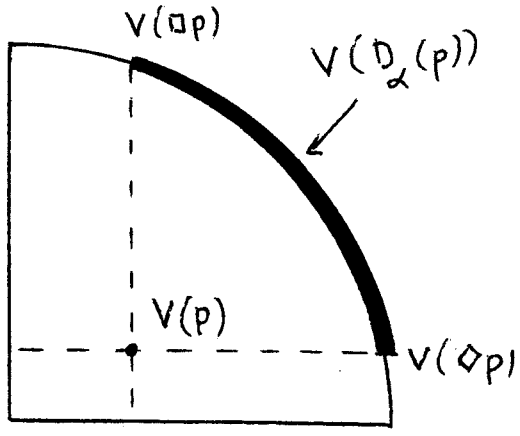

Fig. 4

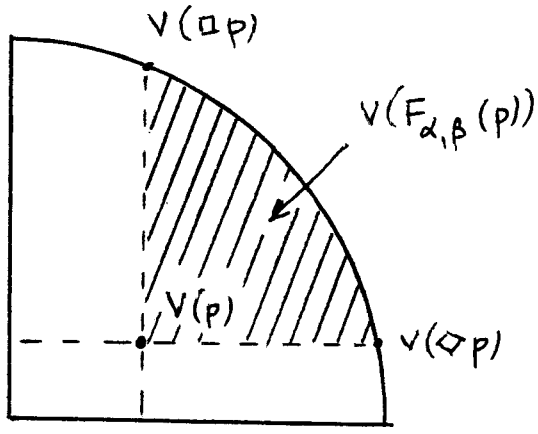

Fig. 5

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