A CENTRAL ALGORITHM OF APPROXIMATION OF LINEAR FUNCTIONALS UNDER FUZZY INFORMATION

SVETLANA ASMUSS[1] AND ALEKSANDRS ŠOSTAKS[2]

Institute of Mathematics of Latvian Academy of Sciences and University of Latvia

Akadēmijas laukums 1, LV-1524, Rīga, Latvia

E-mail: [1]asmuss@lanet.lv, [2]sostaks@latnet.lv

We consider the problem of approximation of a functional B defined on a set X and taking values in R by an information described by n real characteristics in the case when this information is fuzzy in the following sense:

We suppose that an element $x \in X$ is given by the data $z \tilde{\in} Ax$ of the L-fuzzy subset $Ax \in L^{R^n}$, where L is a complete bounded lattice. Thus A is an "information" operator from X to L^{R^n}.

By a method of solution of this problem we mean any functional φ defined on R^n which allows us to get an approximation $\varphi(z)$ of the exact value Bx for each $x \in X$

$$x \in X \implies z \tilde{\in} Ax \in L^{R^n} \implies \varphi(z) \approx Bx \in R.$$

We analyse the error of approximation given by the function φ for an element $z \in R^n$

$$e(\varphi, z) = \mathcal{S}up \ \{ \ |Bx - \varphi(z)| \ : \ x \tilde{\in} U_z \},$$

where U_z is an L-fuzzy subset of X defined by

$$U_z(x) = Ax(z), \ x \in X,$$

and the supremum $\mathcal{S}up$ of an L-fuzzy set of real numbers is defined as in [1].

Our aim is to describe the central algorithm φ^c (cf [2] in the crisp case) such that for every $z \in R^n$ the value $\varphi^c(z)$ gives the centre of the L-fuzzy set $V_z \in L^R$ defined by

$$V_z = B(U_z).$$

REFERENCES

[1] S. Asmuss and A. Šostak. Extremal problems of approximation theory in fuzzy context. *Fuzzy Sets and Systems*, **105** (2), (1999), 249 – 257.

[2] J.F. Traub and H. Woźniakowski. *A general theory of optimal algorithms*. Academic Press, New York - London, 1980.