Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Domain: IT

SUBJECT: Generalized versions of the strong law of large numbers for intuitionistic fuzzy random variables

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Place of research: Systems Research Institute Polish Academy of Sciences

Recruitment & Selection: interview

Number of positions: 1

Project Description

The Kolmogorov version of the strong law of large numbers (SLLN) and its generalizations (see [1]) are important theorems used in statistical inference.

In many practical applications, one assumes that there are two main sources of uncertainty: randomness and imprecision. Imprecision is often modelled by fuzzy sets [2] and their generalizations, including intuitionistic fuzzy sets (IFSs), introduced by Atanassov in the 1980s (see [3]).

Fuzzy random variables are applied to describe uncertain phenomena, which are simultaneously random and imprecise. Corresponding probability theories have been developed for various concepts of fuzzy random variables and their generalizations. Within these theories, appropriate versions of SLLN were formulated and proved. In [4], intuitionistic fuzzy random variables (IFRVs), which can be treated as generalizations of fuzzy random variables for IFSs, were defined, and the law of large numbers for IFRVs was used in statistical learning theory. Another concept of IFRVs was proposed and applied in [5] to an insurance problem. Finally, in [6], generalized versions of the central limit theorem were proved within other non-standard probability theories for IFSs.

The proposed research work, using advanced mathematical and computer science methods, concerns further development of the probability theory for IFRVs, including formulation, proof, and application of generalized versions of SLLN (not restricted to the areas discussed in [4,5]).

References

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3. K. Atanassov. Intuitionistic Fuzzy Sets: Theory and Applications. Physica–Verlag, 1999.

4. Z. Zhang. Some Theoretical Results of Learning Theory Based on Intuitionistic Fuzzy Random Samples. Journal of Advances in Mathematics and Computer Science 4(15), 2197–2216, 2014.

5. C. Li and J. Jin. A Scalar Expected Value of Intuitionistic Fuzzy Random Individuals and Its Application to Risk Evaluation in Insurance Companies. Mathematical Problems in Engineering 2018, doi: 10.1155/2018/8319859, 2018.

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