

Final Report

Aktion Project No. 75p7 (Austria - Czech Republic) Algebraic, fuzzy and logical aspects of statistical learning for cancer risk assessment".

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Outputs:

Research in 2016 was concentrated on study and the development of fuzzy and algebraic structure of statistical learning for cancer risk assessment. We have used results obtained by Nicolis, Kiselak, Porro and Stehlik (2016) in order to define multifractality measure. Paper Paseka, Solovyov, Nicolis, and Stehlik, (2016) introduces an extension of the Sugeno integral on generalized semi-quantales. This extension is used to aggregate the porous dimensions (e.g., multifractal wavelet based Hausdorff dimension and monofractal Box Counting dimension) of subsets of a natural bornological space, which models a human tissue, with applications to cancer risk assessment. We introduced novel aggregation criterion for decision on cancer risk in mammary cancer and clarified the high inter-patient variability. In Stehlik, P. Hermann,P., S. Giebel, and JP.Schenk (2016) we employ mixtures of distributions to receive the more holistic picture of the application of fractal dimension for mammary cancer. All received results have been disseminated at conferences.

Publications

- 1) J. Paseka, S.A. Solovyov, O. Nicolis, M. Stehlik, (2016)Sugeno integral as a way to aggregation in bornological spaces: a new confirmation of inter-patient variability in mammary cancer, submitted to *Information Sciences*
- 2) O. Nicolis, J. Kiselak, F. Porro, and M. Stehlik (2016) Multi-fractal cancer risk assessment, *Stochastic Analysis and Applications*, DOI: 10.1080/07362994.2016.1238766
- 3) M. Stehlik, P. Hermann,P., S. Giebel, and JP.Schenk, On mixed cancer risk assessment, In "Recent Studies on Risk Analysis and Statistical Modeling", *Contributions to Statistics*, SPRINGER, Eds. Oliveira, Kitsos, Amilcar