► BERNHARD STOINSKI, *Extension of category theory using a PL0 calculus functor to form propositional morphisms in multi-agent systems.*

Private Institute for General Dynamic Logic, Herforder Strasse 15, Cologne, Germany.
E-mail: bernhard.stoinski@pifdl.eu.

Abstract: The subject of this talk are morphisms between categories that are able to map truth values by means of a PL0-calculus functor $Calc_0$. This functor is used in the generation of AI multi-agent systems (MAS) [3]. In this case, the agents are equivalent to the categories [1]. A highly simplified example of an AI-MAS using PL0 calculus functors represents the practical aspect of this talk [2]. The special feature of the functor $Calc_0 : A \rightarrow B$ is that the morphism from agent A to agent B yields a truth value $t_A : X \rightarrow [0,1]$, taking A to be a fuzzy set. The function value $m_A(a)$ for $a \in X$ is itself again the membership value formed by the result of a calculus function of A. Hereby A itself becomes a fuzzy set. By this fact, a fuzzy space is formed by means of $Calc_0$, which, however, must not be confused with a type 2 fuzzy set. Through this construct and the self-similarity of the MAS, it is possible to represent complex natural processes with a high entropy [4] content.

[1] Mac Lane, S.. ***Categories for the working Mathematician, Second Edition***, Springer Science+Business Media LLC, Newy York, 1971.

[2] RUST, S.; STOINSKI, B., ***Using Artifical Intelligence to assist Tree Risk Assessment***, Using Artifical Intelligence to assist Tree Risk Assessment, Arboriculture and Urban Forestry, 48, No 2, P. 138-146, 2022.

[3] STOINSKI, B., ***Dynamische Multi-Agent-Systeme Komplexe KI-Systeme: Wann ein kognitiver Ansatz wichtig ist.***, Industry-Of-Things, https://www.industry-of-things.de/komplexe-ki-systeme-wann-ein-kognitiver-ansatz-wichtig-ist-a-06245d3c0db2a1902d95ac3a217f7630/, 2022.

[4] SZILARD, L., ***Über die Entropieverminderung in einem thermodynamischen System bei Eingriffen intelligenter Wesen***, , Zeitschrift für Physik 53, , 1929.