New neutrosophic cognitive map based on linguistic data summarization and single-valued neutrosophic numbers

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In this paper, a new extension of Fuzzy Cognitive Maps (FCMs) for multistage sequential decision–making problems is proposed, which is called Neutrosophic Cognitive Map based on linguistic Data Summarization (NCM–LDS). A system–attic review on the use of FCMs and their extensions to increase the interpretability of results and for the treatment of indeterminacy is conducted. As a consequence, opportunities to improve interpretability were identified through the use of new linguistic models, considering the indeterminacy. The novel aspect of the new extension NCM–LDS lies in the combination of FCMs, neutrosophic theory and linguistic data summarization (LDS) to represent the map relationships, as well as the introduction of new algorithms to perform the activation process by using linguistic summaries. The main advantage of this new approach is that it makes the map construction

process by experts easier and improves the interpret–ability. Furthermore, the suggested NCM–LDS is applied as a decision–making support tool for the diagnosis and treatment of pregnant women with cardiovascular diseases using a dataset with 304 cases of pregnant women with valve dis–eases. In addition, NCM–LDS is compared with the traditional FCM, neutrosophic cognitive map (NCM_Indeterminacy), and Sequential Multistage Triangu–lar Neutrosophic Cognitive Maps (MS–TrNCM) reported in bibliography. Final–ly, in qualitative analysis, the proposed extension obtained the highest expertsévaluations with respect to most of the criteria, especially, those associated with the ease construction of the map and interpretability.