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ON THE DEVELOPMENT OF FUZZY COGNITIVE MAP (FCM)-BASED SCENARIO USING FUTURISTIC DATA

Abstract:

The uncertainty of the business environment has highlighted the strategic gravity of scenario in technology foresight and strategic planning. Fuzzy cognitive map (FCM), among various scenario development approaches, has recently drawn attention due to its relative advantage of combining qualitative knowledge and quantitative structuring process. FCMs are cognitive fuzzy inference graphs, within which the nodes stand for the concepts that are used to describe the behavior of the system and the causal relations between the concepts are represented by signed and weighted arcs. The formalization of FCMs can be achieved by two main groups of methods: deductive modeling using an expert knowledge about the domain of application, and inductive modeling using learning algorithms based on historical data. Although the deductive modeling methods are well-established, they have shortcomings in that they require domain knowledge which can be limited to relatively simple systems and subjective or biased models. The inductive modeling methods which are recently developed, also have limitation in that they only focused on the identification of weight values for given set of concept nodes and rely on historical data based on the assumption that same trends will prevail in future. In this context, we propose that the futuristic data, a collection of future-oriented opinions extracted from websites and online communities of large participation and collaboration of many experts and the general, can be alternative knowledge source for FCM-based scenario development. Since the futuristic data are a priori data containing issues regarding social influence or predictable phenomena, they are suitable source to scan future drivers and changes of scenarios, which will be used as the concept nodes of FCM, and reflect the future-oriented perspectives. Taken together, the primary objective of this research is to propose the approach to applying futuristic data to FCM-based scenario development. Association Rule Mining (ARM) technique is applied to identify concepts and causal weights of FCM because ARM can provide if-then rules from large database. The suggested approach can aid to improve the effectiveness and efficiency of scanning knowledge for FCM-based scenario development.

Keywords:

Scenario, Fuzzy Cognitive Map, Futuristic data