Sequence analysis applying fuzzy graph theory and fuzzy core index method in social network analysis II

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Abstract: Fuzzy information such as human behavior and cognition can be represented by fuzzy graph. In general, the information structure is very complicated and it is difficult to interpret the characteristics of the graph. One of the remaining challenges is its sequence analysis among nodes of the fuzzy graph. In other words, the analysis to obtain the totally ordered set in the graph. This challenge is important issue for relation structure analysis in sociometry analysis and so on. For example, it is important to predict the flow of information in order to obtain the propagation of information such as rumors in a social group. Also, it is very important for school teacher to obtain a communication network flow of the school students. If we have information about the network, it will help us to predict the propagation path when someone catches a cold. As to this problem, Nishida et al. proposed an One-Sided Connectivity Method. This method considers the sequencing problem based on the α cut. In general, this ordering structure may be a partially ordered set. and we couldn't sequence nodes totally in Fuzzy graph. Matsui et al. introduced the method applying GA (Genetic Algorithm) and fuzzy reasoning. This method could be analyzed for the sequencing problem using the linear model. Last time, we proposed a Fuzzy Core Index (hereinafter called "FCI") Method based on fuzzy core value. Generally, applying this method, the ordering structure would be totally ordered set. However, we couldn't order the three-way state. This time, to solve this problem, we propose a method to give fuzziness not only to the arcs of the fuzzy graph but also to the nodes and we show the effectiveness of this proposed method through the case study.

At first, we would introduce the index "fuzzy core index" for sequence analysis. Secondly, we would discuss the relationship between AHP (Analytic Hierarchy Process) method and characteristic analysis of fuzzy graph concerning the fuzzy core index. Finally, we would show the effectiveness of this proposed method through the social network analysis focusing on the fuzzy sociometry analysis which can not assume the transitive law included three-way state. The sociometry analysis developed by Moreno is one of the measurement and evaluation methods of social structure which we could analyze by applying the fuzzy graph theory. According to the data obtained from some simple questionnaires, we can measure the preferring degree among the members of a group and obtain the fuzzy sociogram. Here, indicator FCI that can measure the importance of members in a group can analyze the social structure more effectively just because we can rate the members based on the indicator.
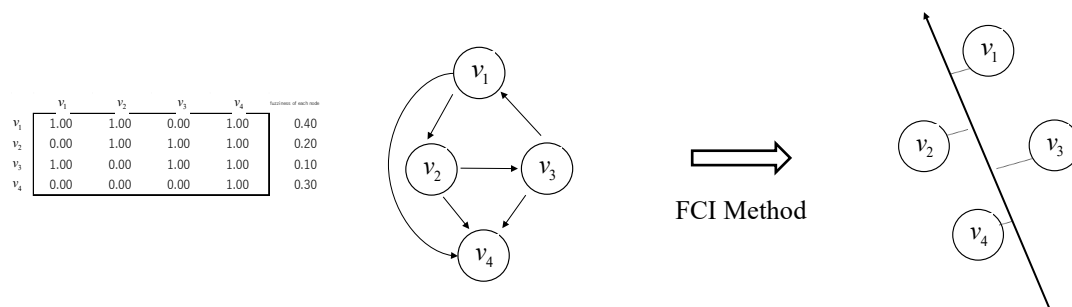

	v_1	v_2	v_3	v_4	fuzziness of each node
v_1	1.00	1.00	0.00	0.00	0.40
v_2	0.00	1.00	1.00	1.00	0.20
v_3	1.00	0.00	1.00	1.00	0.10
v_4	0.00	0.00	0.00	1.00	0.30

Figure 1. Framework of FCI Method : conversion from partially ordered set to totally ordered set

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