

Towards quantification of incompleteness in the pairwise comparisons methods

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May 3 Friday 13:40-15:00 E.305.

Abstract

Apart from consistency, the completeness of information is one of the key factors influencing data quality. In the case of the pairwise comparisons (PC) method, much space in the literature is devoted to the quantitative analysis of this first idea, while the second issue has not been properly studied. The presentation illustrates how the incompleteness of a set of paired comparisons influences the sensitivity of the PC method.

During the research, two important factors related to the incompleteness of PC matrices have been identified, namely the number of missing pairwise comparisons and their arrangements. Accordingly, four easy-to-calculate completeness indices have been developed. Each of them takes into account both the total number of missing data and their distribution in the PC matrix. During the series of Montecarlo experiments, the properties of these indices have been examined. It demonstrated that both the incompleteness and inconsistency of data almost equally contribute to the sensitivity of the PC matrix. The relative simplicity of the proposed indices may help decision makers to quickly estimate the impact of missing comparisons on the quality of final results.