

Indexes of Desirable Properties of a Pairwise Comparison Matrix with Fuzzy Elements

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Abstract. In the Analytic Hierarchy Process (AHP), pairwise comparisons are used to quantify the relative importance of the elements, i.e. the criteria and/or alternatives. Fuzzy elements are appropriate whenever the decision maker is uncertain about the value of his/her evaluation of the relative importance of the elements in question. In this paper, we deal with the general case when the elements of the pairwise comparison matrix are fuzzy subsets of an Abelian linearly ordered group (alo-group). We then propose some desirable properties – consistency, intensity, and coherence – of the fuzzy pairwise comparison matrix and we also propose indexes to measure these desirable properties.

Based on these indexes, a new solution algorithm to find the priority vector satisfying these desirable properties can be formulated.

Keywords: multi-criteria optimization, Analytic Hierarchy Process (AHP), pairwise comparison matrix, fuzzy elements, consistency, intensity, coherence, priority vector, alo-group

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