

UNIVERSITI TEKNOLOGI MARA

**DISTANCE – BASED RANKING OF FUZZY
NUMBERS**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

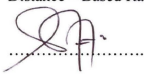
Faculty of Computer and Mathematical Sciences

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AUTHOR'S DECLARATION

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ABSTRACT

Ranking fuzzy numbers is one of the crucial areas of research in fuzzy set theory. Essentially, each presented ranking method is targeting on producing appropriate ranking order for a set of all types of fuzzy numbers including in ranking combinations of more than two fuzzy numbers properly. However, to rank fuzzy numbers appropriately may not be an easy task as fuzzy numbers are represented by possibility distribution hence indicates that they may or may not overlap with each other, having different shapes and distinct in terms of characteristics. Most presented ranking methods are able to rank fuzzy numbers with correct ranking order but there are certain situations where some ranking methods appear to have limitations particularly in ranking non – normal fuzzy numbers, non – overlapping fuzzy numbers and fuzzy numbers of different spreads. As to overcome these limitations, this research proposes a method of ranking fuzzy numbers using distance – based methods involving horizontal – x value, centroid, similarity measure, height and spread of fuzzy numbers. The proposed ranking method is applied to several benchmarking sets of fuzzy numbers for comparison purposes. As the outcomes, the proposed ranking method is found to have the ability on ranking trapezoidal, triangular and vertical line fuzzy numbers, producing correct ranking order for overlapping and non- overlapping case of fuzzy numbers, embedded fuzzy numbers, reflection case of fuzzy numbers and fuzzy numbers on the negative side. Furthermore, the proposed ranking method has also been applied on a real decision making problem faced by a company in Malaysia which is the Facilitators' evaluation in Social Security Organization (SOCISO). In this problem, the comparison between the original approach used by SOCISO and the proposed ranking method was made. The result shown that, using the proposed ranking method, a proper selection of facilitator has been made and this outcome does satisfy the committee members of SOCISO.

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