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A GENERALISED HYBRID SIMILARITY MEASURE OF ROUGH NEUTROSOPHIC SET WITH ROUGHNESS APPROXIMATION

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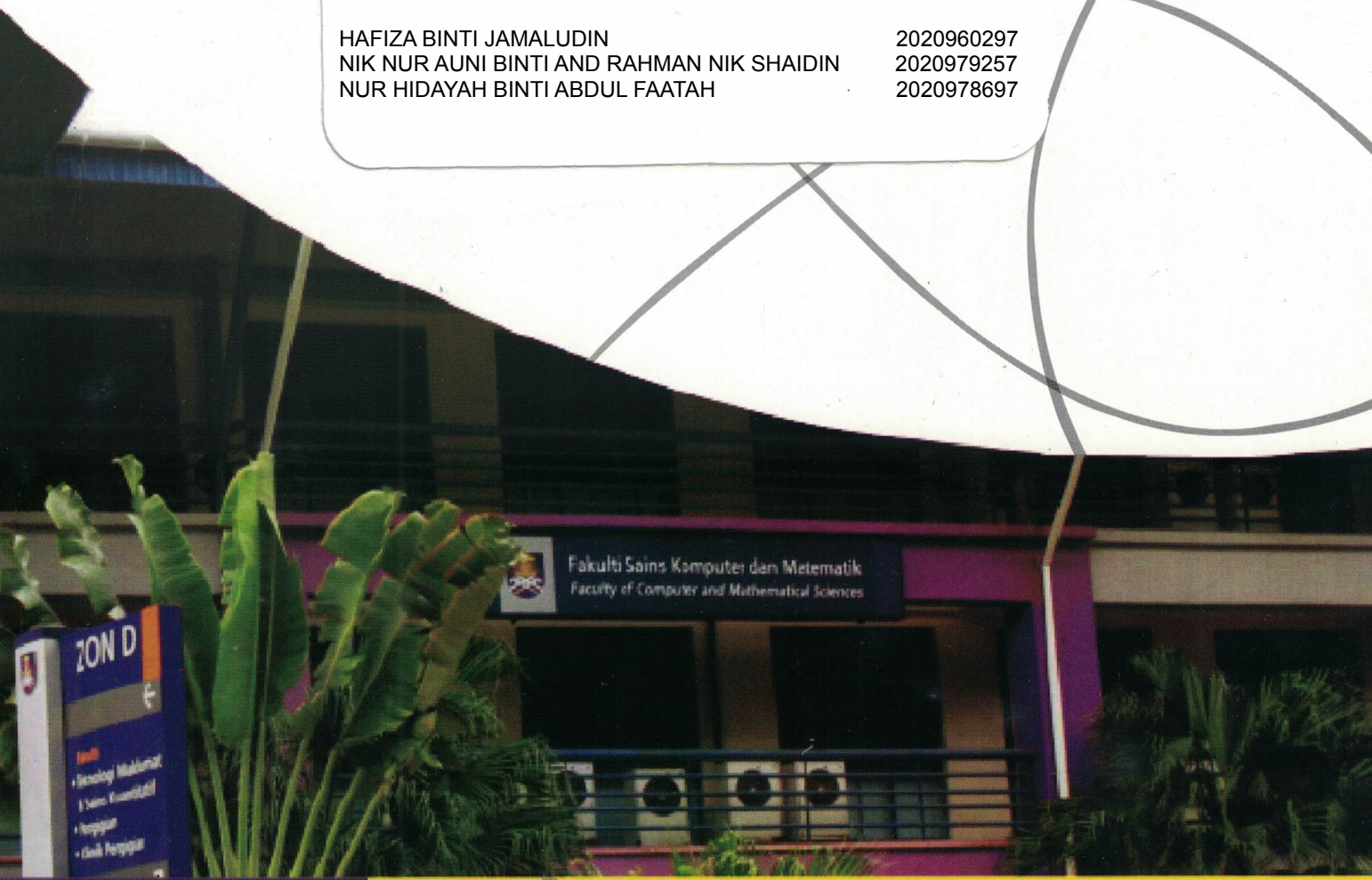

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ABSTRACT

The findings of the similarity measure between two or more expert-provided information are categorized as either a strong or a weak relationship. As a result, getting the results for the similarity measure as the best conclusion for the information relationship is important. Based on the justification from previous studies, the generalised hybrid similarity measure of hamming and cosine similarity measure was chosen as the similarity measure method in this study. In addition, a rough neutrosophic set was chosen as the uncertainty set theory information, which includes the upper and lower approximation and a boundary set was chosen as the set theory application. The objectives of the study are to propose a hybrid similarity measure of rough neutrosophic set with roughness approximation, to formulate a properties of a hybrid similarity measure of rough neutrosophic set satisfied the distance measure properties and to apply the propose hybrid similarity measure of a rough neutrosophic set in the smartphone selection decision making process. The roughness approximation is used in the definition of the generalised hybrid similarity measure between hamming and cosine similarity measure. Following that, the derivation algorithm for smartphone selection is presented. The roughness approximation for a rough neutrosophic set is used to compare the similarity results. The proving result is complete. Then, the derivation of generalised hybrid similarity measure of rough neutrosophic set is well defined. As a validation process, the similarity properties for selection of smartphone is used such as features, a reasonable price, customer care, and risk factor. Finally, if either value of the similarity measure is close to one, a strong relationship between the information given or vice versa is defined.

1 INTRODUCTION

1.1 Research Background

Several mathematical tools have been created to modelling and solving the real-world problems. In the fields of computer science and artificial intelligence, the vagueness or ambiguity of incomplete information becomes a major problem. Hence, to deal with the problems, Zadeh (1965) presented fuzzy set (FS) theory which enabled a set with a membership degree value between 0 and 1. A membership function $f_A(x)$ is used to describe a fuzzy set A in universal set X, which associates a real number in the interval [0, 1]. As a result, the closer $f_A(x)$ is to unity, the higher the grade of $x's$ membership in A. When A is a set in the traditional sense or logic thinking, its membership function may take only two values: 0 and 1, with the result $f_A(x) = 1$ or 0 depending on whether x belongs to A or not.

Atanassov (1986) proposed the idea of intuitionistic fuzzy set (IFS) as a generalization of fuzzy set that deals with the concept of vagueness. Both membership and non-membership roles are included in this definition, therefore the information and semantic representation become more relevant and applicable. Intuitionistic fuzzy set have been extensively studied and applied in a variety of fields, including logic programming and reasoning, decision-making problems and so on.

Besides that, Pawlak (1982) introduced the definition of rough sets, which expresses complexity in the notions of lower and upper approximations of a set, as well as the use of the set's boundary field. The mathematical foundation of rough sets is made up of two fundamental elements in rough set theory which are crisp set and equivalence relation. The basic concept of a rough set is that it is built on the approximation of sets by a pair of sets called the lower and upper approximations of a set. The equivalence relation is used to determine the lower and upper approximation operators. Many scholars have developed models based on different aspects, such as the universe, relations, objects, and operators after Pawlak.