QoS INTUIONISTIC FUZZY DECISION-MAKING IN MOBILE CLOUD OFFLOADING SYSTEMS BASED ON EXTENSION THEORY

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The offloading process is one of the techniques used in mobile cloud computing (MCC) to enhance the capabilities of mobile devices by moving mobile data and computation applications to cloud platforms [1]. Cloud-path selection will be a crucial issue due to the intensive development of MCC. Recently, several similar alternative cloud services are considered and evaluated in terms of many different Quality of Service (QoS) criteria such as *performance*, *bandwidth*, *security*, *financial*, *availability*, etc. that need to be considered when making final decisions in cloud-path selection problem [2].

In this paper, due to the uncertain intervals and the incomplete attribute information in a fuzzy environment of the complex MCC process with contradictory QoS criteria, a model and computing method for the multi-attribute extension intuitionistic fuzzy decision–making (MAEFDM) of cloud-path selection is proposed. This model is developed based on the intuitionistic fuzzy set (IFS) [3] and the extension theory (ET) [4]. The ET was originally created by W. Cai [4] to solve contradictions and incompatibility problems by the transformation of the matter - elements. The extension set (ES) extends the IFS from $[0,1]$ to $[-\infty,\infty]$. This means that an element belongs to an ES with a different degree, defined by the membership function $K(x)$ that represents the degree to which an element belongs to that ES. A degree between zero and one corresponds to the normal fuzzy set. When $K(x)<0$, it describes the degree to which the element does not belong to an ES, which is not defined in a fuzzy set. When $-1<K(x)<0$, this means that the element x still has a better chance of being included in the ES if this ES is adjusted.

By adopting the intuitionistic fuzzy matter - element, the obtained MAEFDM matrix and extension distance is standardized. Then, the synthetic weights of QoS indexes criteria that include both subjective preference and objective information are given. Finally, a numerical analysis example is performed to evaluate the model.

In our future work, we will try to create and develop a software Toolkit with a friendly graphical interface to implement the MAEFDM proposed approach.

This work was carried out within the national project of applied scientific research 14.820.18.02.03 / U.

Keywords: *Cloud computing, decision-making, extension theory, intuitionistic fuzzy number, Quality of Service, matter-element.*

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