An Integrated TOPSIS Model with Exponential Intuitionistic Entropy Measure for Multi-Attribute Decision-Making (MADM)

Omar Ayasrah , **Faiz Mohd Turan** ,
and **Sheikh Muhammad Hafiz Fahami**

Abstract The determination of attribute weights in solving multi-attribute decision-making (MADM) problems is crucial and significantly impacts the results. Many researchers have highlighted the effectiveness of deriving attribute weights objectively based on the assessments provided by decision-makers for MADM problems. One approach involves using entropy measures to determine weights based on the given ratings. This paper introduces a novel intuitionistic fuzzy entropy measure that takes the form of an exponential function. This new entropy measure is combined with the TOPSIS method to propose a new decision-making method for solving MADM problems. The proposed method does not require attribute weights, thereby eliminating the need for their determination.

Keywords TOPSIS · Exponential intuitionistic entropy measure · MADM

1 Introduction

Multi-attribute decision-making (MADM) constitutes a pivotal process aimed at resolving issues associated with selecting the most appropriate solution or option based on pre-defined criteria [1]. These methods are commonly deployed to determine the optimal choice while taking into account multiple criteria or attributes [2, 3]. The fundamental goal is to furnish decision-makers with an effective and logical approach to thoroughly assess both objective and subjective aspects of the given problem [4–6]. To attain more accurate results and handle imperfect or imprecise data, researchers have increasingly turned to the application of fuzzy set theory and intuitionistic fuzzy set theory [7]. The realm of fuzzy MADM has garnered noteworthy attention as a significant field of research [8].

O. Ayasrah · F. Mohd Turan (✉) · S. M. H. Fahami
Faculty of Manufacturing and Mechatronic Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, 26600 Pekan, Pahang, Malaysia
e-mail: faizmt@umpsa.edu.my