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PERBANDINGAN KEPUTUSAN MULTI-ATRIBUT BERASASKAN BEBERAPA TEORI SET

(Comparison of Multi Attributes Decisions Based on Several Set Theories)

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ABSTRAK

Dalam makalah ini dibincangkan analisis perbandingan keputusan multi-atribut yang diperoleh hasil daripada pendekatan penilaian menggunakan teori set ketara, set kabur, set kabur berintuisi dan set dwikabur konflik. Perbincangan tertumpu kepada analisis yang melibatkan penilaian secara dedua dalam teori set biasa, penilaian secara [0,1] dalam set kabur, penilaian secara 'darjah keahlian' dan 'darjah bukan keahlian' serta syarat $0 \leq \mu_A(x) + \gamma_A(x) \leq 1$ dalam set kabur berintuisi, dan penilaian secara 'timbal balas' (*i.i*., positif dan negatif) dalam set dwikabur konflik. Bagi tujuan ini, keempat-empat teori set dibincangkan secara ringkas dari aspek takrif, kesamaan dan perbezaan serta cara pendekatan yang digunakan untuk mendapat indeks hampiran relatif. Aplikasi pengiraan berangka secara bandingan menggunakan TOPSIS (*Technique for Order Preference by Similarity to Ideal Solution*) turut diberikan untuk semua pendekatan teori di atas. Keputusan pengiraan menunjukkan, perbezaan yang ketara pada nilai indeks hampiran relatif selain susunan keutamaan alternatif yang berbeza antara set ketara dengan teori set yang lain. Dapatan juga menunjukkan susunan keutamaan alternatif untuk tiga teori set kecuali set ketara adalah sama dan konsisten. Keputusan sebegini sekaligus memberi peluang dan ruang yang luas kepada penyelidik untuk mengkaji secara lebih mendalam pada masa hadapan.

Kata kunci: Pembuat keputusan multi-atribut; set dwikabur konflik; set kabur; set kabur berintuisi; TOPSIS (*Technique for Order Preference by Similarity to Ideal Solution*)

ABSTRACT

This paper discusses the comparison analyses for multi-attributes decision derived from crisp set, fuzzy set, intuitionistic fuzzy set and conflicting bifuzzy set. It focuses on the different evaluation approach using the binary system in crisp sets, the membership degree in [0,1] for fuzzy sets, the membership and non-membership degrees with condition $0 \leq \mu_A(x) + \gamma_A(x) \leq 1$ in intuitionistic fuzzy sets, and 'equilibrium evaluation approach' (i.e., positive and negative aspects) in conflicting bifuzzy sets. To meet these objectives, all the set theories are briefly discussed specifically the definitions, equalities, the differences as well as the different evaluation approaches to obtain the relative approximation index. A numerical example using Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is also presented to clarify each of the above set theories. From the calculation results, it shows the significant differences of relative approximation index for each theory and different rating between the crisp set and other set theories. It is also found that all the set theories have recorded the same rating and consistent, except crisp sets. Thus, this situation offers wider opportunities to investigate more deeply and holistically for future research.

Keywords: Conflicting bifuzzy sets; fuzzy sets; intuitionistic fuzzy sets; multi-attribute decision making; TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)

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