

Similarity Measure of Complex Vague Soft Sets and Its Application to Pattern Recognition

Abstract: The precise representation and analysis of complex data sets have become an increasingly important concern in areas such as medical diagnosis, economics, stock market analysis and pattern recognition. The advent of digital technology has resulted in the ubiquity of digitalized images and patterns. Unlike analog images and patterns, digital images and patterns are defined multi-dimensional data that consists of information pertaining to the physical and non-physical attributes of the images. This calls for a suitable complex fuzzy-based model that has the ability to represent multi-dimensional data in a succinct and concise manner. This paper achieves this goal using the complex vague soft set (CVSS) model to represent the multi-dimensional information for digital images. The information measures of CVSSs pertaining to the measures of distance and similarity are then established with the aim of solving pattern recognition problems involving digital images. The axiomatic definition of the distance-based similarity measure of CVSSs is introduced and the relations between this similarity measure and the distance measure of CVSSs are proposed and verified. The utility of this measure is demonstrated by applying it in a pattern recognition problem involving digitalized images that are defined by multi-dimensional data pertaining to the physical features and nonphysical features such as the geographical data and timestamp of the images.

Keywords: Complex vague soft set, Similarity measure, Complex fuzzy set, Pattern recognition
Digital image.

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