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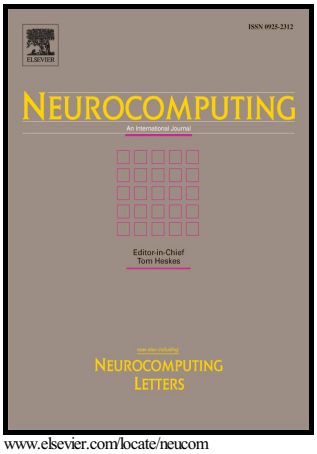

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Behnam Tavakkol, Myong Kee Jeong, Susan L. Albin

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Behnam Tavakkol, Myong Kee Jeong*, Susan L. Albin

Department of Industrial and Systems Engineering, Rutgers University, Piscataway, NJ, 08854

behnam.tavakkol@rutgers.edu
mjeong@rci.rutgers.edu
salbin@rci.rutgers.edu

*Corresponding author. Dr. Myong K. Jeong Associate Professor, Department of Industrial & Systems Engineering, Rutgers University 96 Frelinghuysen Road CoRE Building, Room 204 Piscataway, NJ 08854, Tel.: 848-445-4858; mjeong@soe.rutgers.edu

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Abstract

Uncertain objects, where each feature is represented by multiple observations or a given or fitted probability density function, arise in applications such as sensor networks, moving object databases and medical and biological databases. We propose a methodology to classify uncertain objects based on a new probabilistic distance measure between an uncertain object and a group of uncertain objects. This object-to-group probabilistic distance measure is unique in that it accounts separately for the correlations among the features within each class and within each object. We compare the proposed object-to-group classifier to two existing classifiers, namely, the K-Nearest Neighbor classifier on object means (certain-KNN) and the uncertain-naïve Bayes classifier. In addition, we compare the object-to-group classifier to an uncertain K-Nearest Neighbor classifier (uncertain-KNN), also proposed here, that uses existing probabilistic distance measures for object-to-object distances. We illustrate the advantages of the proposed classifiers with both simulated and real data.

Keywords: Data Mining; Uncertain data; Classification; Probabilistic Distance Measures

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