HUMAN BEHAVIOUR RECOGNITION, IDENTIFICATION, AND COMPUTER INTERACTION

Edited by

Othman Omran Khalifa, B.Sc. ,M.Sc., Ph.D.,
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Chapter 16

Fuzzy Set Theory

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16.1 Introduction

Fuzzy set theory was introduced in 1965 by Dr. Lotfi Zadeh to represent/manipulate data and information possessing nonstatistical uncertainties. He has developed considerably since its inception. Although initially the new and revolutionary ideas were viewed controversially in the realm of mathematics, they were more welcomed in several fields of engineering, especially control engineering, as they provided a good interface with real world applications of mathematics. The main advantage of fuzzy mathematics is that practical situations can be represented in more than one condition and mathematically rigorous calculations can be performed without the need to restrict the problem in only one representation. One automatic consequence of this is that fuzzy mathematics allows for much more realistic models of real-world situations – a need keenly felt in intelligent video surveillance.

16.2 Sets:

In mathematics, a set is a collection of objects – called elements. If an element belongs to a set, it can be called a member of the set. These elements are usually distinct so that no one element in a set is equal to another element, however they have a unifying characteristic that enables them to belong to a particular set. An element may belong to two or more sets if it satisfies the criteria for membership of the sets (Hausner, M. 1992). For instance, the integer 3 is a member of the universal set of numbers. It is also positive and a rational number. However, it is not an element of the set of negative numbers or irrational numbers. If we were to describe the number 3 in terms of Boolean logic, then the description would look something like: