

# A REVIEW OF DEVELOPMENTS FROM FUZZY RULE BASES TO FUZZY FUNCTIONS

I. Burhan Turksen\*†

Received 03:01:2012 : Accepted 28:08:2012

## Abstract

We first touch upon a Philosophical Grounding of fuzzy theory expressed by Pierce and Zadeh. Then we review briefly basic and well known fuzzy rule base models and their variations as well as our fuzzy functions with LSE and their enhanced version. We propose a potential future investigation for the basic structure of fuzzy function models generated with an additive effect of membership values and suggest future research for a multiplicative affect of membership values.

**Keywords:** System structure identification, Fuzzy rule bases, Fuzzy functions with additive components, Future research for fuzzy functions with multiplicative components.

*2000 AMS Classification:* 03 B 52, 03 E 72, 94 D 05, 46 S 40.

## 1. Philosophical grounding

It is important to understand an in-depth association of the essential concepts that were treated by Charles S. Peirce and Lotfi A. Zadeh.

Peirce's thesis may be represented as "indeterminacy and determinacy" of "symbols". This view can now be interpreted and expressed with the degree assignment to information granules

Thus in general a symbol  $S$  is indeterminate iff  $(\exists P) \sim (S \text{ is } P \text{ or } S \text{ is } \sim P)$ .

Hence, Locke's famous idea of the triangle is stated as:

"It is not the case that a triangle in general is scalene or that is it not scalene".

---

\*I. Burhan Turksen, Ph.D., P.Eng. Fellow: IFSA, IEEE, WIF, Department of Industrial Engineering, TOBB-Economics and Technology University, Soğutözü Cad. No: 43, Soğutözü 06560, Ankara, Turkey. E-mail: [bturksen@etu.edu.tr](mailto:bturksen@etu.edu.tr)

†Director-Knowledge/Intelligence Systems Laboratory, Department of Mechanical & Industrial Engineering, University of Toronto, Toronto, Ontario, M5S 3G8, Canada.  
E-mail: [turksen@mie.utoronto.ca](mailto:turksen@mie.utoronto.ca)