

# Fuzzy Logic versus Uncertainty Theory – What are the issues?

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## Abstract

Zadeh (1965) proposed the concept of a fuzzy set, which he envisioned as a class of objects with a continuum of grades of membership ranging between zero and one, and which encompassed such notions as inclusion, union, intersection, complement, and convexity. That concept was the foundation for what has come to be known as fuzzy logic. According to Google Scholar, Zadeh (1965) has been cited over 50,000 times.

Recently, Liu (2010) postulated that fuzzy logic is ill-conceived, and that it ought to be replaced by another mathematical tool, namely uncertainty theory. Moreover, he argues that it is inappropriate to focus on the different explanations between fuzziness and uncertainty, and that we should, instead, compare them from a measure perspective.

Given the number of fuzzy logic articles in insurance and related areas, and that articles based using uncertainty theory are beginning to appear in these areas, the foregoing observations need to be reconciled. To this end, three relevant questions are: (1) on what basis does Liu postulated that fuzzy logic is ill-conceived, (2) what are the differences and similarities between fuzzy logic and Liu's uncertainty theory, and (3) how are the metrics for these two views implemented? The purpose of this presentation is to explore the answers to these questions.

Liu, B. (2010) *Uncertainty Theory: A Branch of Mathematics for Modeling Human Uncertainty*, Springer-Verlag Berlin Heidelberg.

Zadeh, L. A. (1965) Fuzzy sets, *Information and Control* 8, 338-353.