

Preface

As early as in the era of Lady Ada Loveable and Babbage, scientists seriously considered the possibility of assigning certain complex activities performed by human beings to machines. This direction of research has significantly intensified, with the development of digital computers, through immense contributions by Turing and von Neumann and the progress in the discipline of artificial intelligence (AI). Following a period of enthusiasm about the possibility on one hand, and computer phobia on the other hand, many of the active AI researchers have faced, and attempted to resolve, an apparent obstacle. The formal philosophical and mathematical paradigms applied in AI and related research areas seemed to fall short of the capability to emulate human reasoning. In some sense, the issue was that the formalisms were very rigid and did not match the fuzzy nature of human perception of sets and inference.

A pioneer of artificial intelligence, L.A. Zadeh was concerned with the dichotomy between human reasoning and classical-logic/mathematical/machine precision. As early as 1961 (and most likely before) Zadeh attempted to resolve this dichotomy with a formal, mathematical theory of imprecision, aka Fuzzy Set Theory and Fuzzy Logic. The first documented reference to the need for this theory appears in his 1962 paper “From Circuit Theory to System Theory.” The first formulation of a solution to the dichotomy is proposed in his seminal paper “Fuzzy Sets” published in *Information and Control* in 1965. These concepts, as well as several derivatives of the ideas, such as linguistic variables, Type-2 Fuzzy Logic, and Z-numbers, introduced by Zadeh, have opened the door to highly fruitful directions of research, development, and deployment in several areas.

Zadeh’s 1965 paper and subsequent papers have sparked the interest of numerous researchers and practitioners and resulted in rapid developments in the fields of Fuzzy Set Theory, Fuzzy Logic, Fuzzy Systems, and related disciplines. The five decades that followed the 1965 paper and his pioneering work have produced a multitude of research work and applications related to artificial intelligence, control theory, inference, and reasoning. In recent years, Fuzzy Logic has been applied in many areas, including neural networks, clustering, data mining, and software testing.

The present volume, entitled “Fifty Years of Fuzzy Logic and its Applications,” was conceived as a way of academic celebration of the fifty years’ anniversary of the 1965 paper. It includes papers from pioneers and prominent scholars engaged in research on the theory and applications of fuzzy logic and uncertainty management. The papers cover a wide range of the spectrum and gamut of “Fuzziness.”

The volume editors extend sincere gratitude to the distinguished chapter authors for their invaluable contributions and their kind patience in complying with the bureaucratic procedures involved in publishing this volume.

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