

Preface

Professor Krassimir Todorov Atanassov is a Bulgarian mathematician with outstanding contributions in the areas of fuzzy logic and fuzzy mathematics, uncertainty analysis, mathematical modelling, and decision making, as well as some areas of number theory, notably the arithmetical functions and Fibonacci objects.

In 1982, Professor Atanassov proposed a novel mathematical formalism for the description, simulation and control of parallel processes, named by him the Generalized Nets which represents a generalization of the well-known concept of the Petri Nets and all their hitherto existing extensions and modifications. During the course of years, Professor Atanassov has developed the main theoretical foundations and analytic tools for the Generalized Nets, and—in collaboration with many specialists from various fields of science and practice—has stimulated and developed applications of this mathematical apparatus in various areas of science, business and technology, notably artificial intelligence, medicine, telecommunication, transportation, chemical and petrochemical industries, and many more. He is one of the very few people in Bulgaria who holds two different Doctor of Sciences degrees, both from the Bulgarian Academy of Sciences; his first D.Sc. in Technical Sciences was granted to him in 1997 for his research in the area of Generalized Nets.

Another significant field of Professor Atanassov's research interests is the theory of *fuzzy sets* proposed in 1965 by Professor Lotfi A. Zadeh, who later originated the idea of soft computing. In 1983, Professor Atanassov proposed an essential and far reaching extension of the concept of a fuzzy sets, called an *intuitionistic fuzzy set*, in which to the degree of membership (belongingness) of an element to a (fuzzy) set, which is from the unit interval, there is assigned an additional degree that of non-membership (non-belongingness) of an element to a (intuitionistic fuzzy) set, which is also from the unit interval. These two degrees, of membership and non-membership, sum up to a number from the unit interval, not necessarily to 1. The complement of the sum of the degrees of membership and non-membership to 1 constitutes a third degree, that of uncertainty. This opportunity of rendering account of the uncertainty makes the concept that Atanassov pioneered a particularly powerful and flexible instrument in the area of uncertainty analysis and decision making.

It is now a globally recognized scientific field on its own which relates to other fields such as the theory of fuzzy sets, fuzzy logic, mathematical logic, notably multi-valued logic, etc. His second D.Sc. in Mathematical Sciences was awarded in 2000 for his research on intuitionistic fuzzy sets.

For his contributions in the field, in 2013, the International Fuzzy Sets Association (IFSA) elected Professor Atanassov as the IFSA Fellow; and he is the first Bulgarian working in Bulgaria, and the second Bulgarian altogether, who has received this recognition. In 2013, Professor Atanassov was awarded the 'Pythagoras' Prize of the Bulgarian Ministry of Education and Science for established researcher in the field of engineering sciences. In the same year, he was also elected the Corresponding Member of the Bulgarian Academy of Sciences.

Professor Atanassov has authored and co-authored 30 monographs, more than 1,000 publications in international journals and conferences, and has served as a supervisor of more than 20 Ph.D. students. His research is now being followed and developed in multiple countries around the world by various research groups including his own numerous Ph.D. students.

This volume is a small token of appreciation for Professor Atanassov on his 60th anniversary for his great scientific achievement, multifaceted support of research activities and researchers from all over the world, and his constant enthusiasm and readiness to undertake new scientific challenges. We also greatly appreciate his great human qualities and friendship.

We wish to thank all the contributors to this volume for their excellent scientific works which involve many novel research results, insightful and inspiring analyses, as well as relevant applications. We wish to thank Dr. Thomas Ditzinger, Dr. Leontina Di Cecco and Mr. Holger Schaepe from Springer for their help and support to prepare this volume.

June 2015

Plamen Angelov
Sotir Sotirov

Imprecision and Uncertainty in Information
Representation and Processing
New Tools Based on Intuitionistic Fuzzy Sets and
Generalized Nets

Angelov, P.P.; Sotirov, S. (Eds.)

2016, XI, 414 p. 95 illus. in color., Hardcover

ISBN: 978-3-319-26301-4