

Preface

This volume contains the peer-reviewed papers presented at the **9th International Conference on Soft Methods in Probability and Statistics (SMPS 2018)**, which was held in conjunction with the 5th International Conference on Belief Functions (BELIEF 2018) on 17–21 September 2018 in Compiègne, France. The series of biannual International Conference on Soft Methods in Probability and Statistics started in Warsaw in 2002. It then successfully took place in Oviedo (2004), Bristol (2006), Toulouse (2008), Oviedo/Mieres (2010), Konstanz (2012), Warsaw (2014) and Rome (2016). SMPS and BELIEF 2018 were organized by the Heudiasyc laboratory at the Université de Technologie de Compiègne.

Over the last decades, the interest for extensions and alternatives to probability and statistics has significantly grown in areas as diverse as reliability, decision-making, data mining and machine learning, optimization, etc. This interest comes from the need to enrich existing models, in order to include different facets of uncertainty such as ignorance, vagueness, randomness, conflict or imprecision. Frameworks such as rough sets, fuzzy sets, fuzzy random variables, random sets, belief functions, possibility theory, imprecise probabilities, lower previsions, desirable gambles all share this goal, but have emerged from different needs. By putting together the BELIEF and SMPS conferences, we hope to increase the interactions and discussions between the two communities and to converge towards a more unified view of uncertainty theories.

We also think that the advances, results and tools presented in this volume are important in the ubiquitous and fast-growing fields of data science, machine learning and artificial intelligence. Indeed, an important aspect of some of the learned predictive models is the trust one places in them. Modelling carefully and with principled methods, the uncertainty associated to the data and the models is one of the means to increase this trust, as the model will then be able to distinguish reliable predictions from less reliable ones. In addition, extensions such as fuzzy sets can be explicitly designed to provide interpretable predictive models, facilitating user interaction and increasing their trust.

The joint event collected 76 submissions, each reviewed by at least two reviewers. Twenty-nine of these are included in the present volume, which contains contributions of foundational, methodological and applied nature, on topics as varied as imprecise data handling, linguistic summaries, model coherence, imprecise Markov chains and robust optimization. The resulting proceedings was easily produced through the use of EasyChair.

We would like to thank all the persons that made this volume and this conference possible which include all contributing authors, organizers, programme committee members that help to build such an attractive programme. We are especially grateful to our three invited speakers, Thomas Augustin (*Ludwig-Maximilians-Universität München*) for his talk “Belief functions and valid statistical inference”, Scott Ferson (*University of Liverpool*) for his talk “Non-Laplacian uncertainty: practical consequences of an ugly paradigm shift about how we handle not knowing” and Ryan Martin (*North Carolina State University*) for his talk “Belief functions and valid statistical inference”. We would like to thank all our generous sponsors: Elsevier and the International Journal of Approximate Reasoning, the Laboratory of excellence MS2T, the Heudiasyc laboratory, the International Society of Information Fusion (ISIF), the Compiègne University of Technology, the city of Compiègne. Furthermore, we would like to thank the editor of the Springer series of Advances in Soft Computing, Prof. Janusz Kacprzyk, and Springer-Verlag for their dedication to the production of this volume.

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