

Editorial

The intent of the technology of fuzzy sets is to provide a sound and comprehensive environment to deal with uncertainty that come into play when dealing with complex systems. Uncertainty permeates also software artifacts and software processes. It is inherently associated with the human factors involved in any design or analysis. One may also say that the factor of uncertainty is associated with the complexity and the abstract nature of software processes.

This special issue is devoted to the role of fuzzy sets in Software Engineering. Fuzzy sets have a special role to play. In a nutshell, fuzzy sets are information granules that realize abstraction and help capture concepts with continuous boundaries. In this sense, they cope with a problem of dichotomy associated with set theory or two-valued logic and allow to build models that are more in rapport with the real-world of problem solving. An idea of partial membership is dominant. We use linguistic terms (say, a *medium* size of software, *high* reliability of a system, etc.) to capture the essence of the problem and form an efficient communication platform. Interestingly, fuzzy sets through the notion of partial membership handled there can flag a potential problem of incomplete, non-specific information as to possible actions in decision-making or design processes and alert the designer as to potential problems. While fuzzy sets form a well developed discipline being exploited across various application areas, their direct use in Software Engineering has not been that fully visible and there are many opportunities awaiting to be explored in pursuing future research in this rapidly growing area, the reader may consult [1].

The three papers included in this special issue clearly identify and address a number of key representative aspects of fuzzy sets that are of importance to Software Engineering. The paper by Marcelloni and Aksit shows how fuzzy sets and fuzzy logic contribute to the improvement of object-oriented methods. An important finding is that fuzzy logic helps build a designer-friendly and expressive environment in which one can articulate and formalize intuition and perception processes of software engineers. The study by Cimpan and Oquendo shows how to deal with monitoring software processes in the framework of fuzzy logic. It is shown that fuzzy logic

provides an essential language for defining monitoring mechanisms. Finally, the paper by Musílek et al. tackles an important and burning question of software cost estimation. No matter which software cost estimation model is considered, the uncertainty regarding crucial variables (such as a number of lines of code) has to be included and the results should reflect this phenomenon. Here the authors cast the problem in the setting of fuzzy arithmetic – a formal tool of processing fuzzy numbers.

We hope that this special issue will raise awareness about the role of fuzzy sets in Software Engineering and help consider this technology as an attractive conceptual framework and efficient environment supporting various facets of software design and analysis.

Witold Pedrycz and Petr Musílek

Reference

- [1] W. Pedrycz, J.F. Peters, *Computational Intelligence in Software Engineering*, World Scientific Press, Singapore, 1998.