# Editorial "special issue on artificial intelligence in practice – from theory to application"

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The 32nd International Conference on Industrial, Engineering and Other Applications of Applied Intelligent Systems (IEA/AIE) took place July 9th–11th, 2019, in Graz, Austria. Screening all the accepted papers, the top 7 authors of the accepted papers were encouraged to submit their papers for this special issue, asking for substantial extensions to their submissions for creating manuscripts that are appropriate for being published in Applied Intelligence. All of the finished accepted papers shared a focus on dealing with applications of artificial intelligence methodologies and techniques. Some of the papers focused more on the foundations when given a challenge of practical and industrial interest, whereas others present a particularly smart solution for a concrete application domain.

Philippe Fournier-Viger et al.'s paper titled "TSPIN: Mining Top-k Stable Periodic Patterns" falls into the category of knowledge extraction from data, where the focus is on frequent itemset mining and, in particular, finding stable patterns. Besides offering discussions of the foundations and challenges, the paper also provided readers with an experimental analysis considering several datasets.

In "CIMMEP: Constrained Integrated Method for CBR Maintenance Based on Evidential Policies," Safa Ayed and colleagues tackle the challenge of maintaining case-based reasoning systems. For this purpose, the authors suggest exploring maintenance based on policies and constraints. Due to the importance of application maintenance that is required for keeping systems and applications operational and usually involves high costs or the expenditure of other resources, any means for improvements in this direction are highly welcome.

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Matthias Eder and colleagues' paper "Creating a robot localization monitor using particle filter and machine learning approaches" describes improvements in respect of localization tasks for mobile robots. The paper deals in particular with identifying problems in the localization at runtime. For this purpose, the authors suggest using deep learning to identify temporal patterns in particles used for localization that indicate an invalid or degraded perceived position. Complementing their outline of the underlying method, the authors also use simulations of an industrial transport robot environment to evaluate their approach.

In "On-board autonomy operations for OPS-SAT experiment," Simone Fratini et al. raise the importance of increasing autonomy for space missions. In their paper, the authors propose a planning and execution architecture currently under development at ESA which is to be used on-board to allow space probes to make decisions while under operation.

Kristian Knausgård et al. propose a deep learning approach for detecting and classifying fishes underwater using camera images in their paper entitled "Temperate fish detection and classification: a deep learning-based approach". This work is based on real data that was obtained using an ordinary waterproof video camera in the North Sea close to Norway. The authors present an experimental study setup and detailed results.

Similar to P. Fournier-Viger et al.'s paper, Cheng-Wei Wu and colleagues tackle the challenge of frequent itemset mining in their paper "Efficient algorithms for deriving complete frequent itemsets from frequent closed itemsets." In their manuscript, the authors focus on reducing the number of generated itemset, to avoid strenuous and long execution times. Their solution is based on a lossless condensed representation of frequent itemsets. Cheng-Wei Wu et al. introduce efficient algorithms based on different strategies and present the results obtained in an experimental evaluation.

The final manuscript, "Applying matrix factorization to consistency-based direct diagnosis," authored by Seda Polat Erdeniz et al., deals with diagnosis as a basis for configuration problems when efficient solving is required in real-world

applications. The authors suggest to trade-off diagnosis quality versus runtime performance, exploiting learning for constraint ordering and where matrix factorization is used to estimate diagnoses. An experimental analysis is carried out to show that the approach improves the computation time of diagnoses.

We congratulate all the authors of the papers that were finally accepted for this special issue, which provided essential contributions to bringing Artificial Intelligence into practical applications. We encourage the interested reader to browse through all these papers and submit their own work on Applied Intelligence to be considered for publication in future issues of this journal or presentation at a future IEA/AIE conference.