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Preface

The contents of this special issue comprise four research papers devoted to engineering optimization, three of which were presented during the 2nd edition of the Workshop on Engineering Optimization (WEO-2021). The workshop was held in Warsaw, Poland, on October 7–8, 2021. Due to the COVID-19 pandemic, the 2021 edition of the workshop was organized in a hybrid form and was dedicated to the exchange of experiences in the field of engineering optimization including its theoretical and algorithmic aspects as well as practical applications. The workshop hosted six invited lectures and six thematic sessions. 21 presentations by authors from seven European and non-European countries (50% of them from outside Poland) were delivered.

Additionally, the organization of the second edition of WEO was supported by the project entitled *Development of regional network on autonomous systems for structural health monitoring* financed by the Visegrad Fund, under the grant agreement 22110360. More details on the workshop and the V4SHM project can be found on the following website: http://v4shm.ippt.pan.pl.

The present issue begins with an overview of methods for explainability and interpretability of various artificial intelligence techniques [1]. The Authors provide an extensive description of over 230 papers related to that topic and formulate conclusions indicating what criteria are the most promising for good explanation of the predictions given by a particular deep learning model.

Next, the paper co-authored by Bruggi, Laghi and Trombetti [2] analyzes the peculiar anisotropy appearing in alloys fabricated by wire-and-arc additive manufacturing (WAAM). In this contribution, the optimal design of WAAM-produced I-beams is addressed assuming that a web plate and two flat flanges are printed and subsequently welded to assemble the structural component.

The paper authored by Szklarski [3] deals with a non-trivial problem of finding a trajectory of a robotic system consisting of a group of robots. The Author analyzes an appropriate coverage path planning (CPP) algorithm. By means of statistical analysis, using an extensive, realistic set of synthetic maps, it is shown that the proposed algorithm meets the criteria for applying it in the production process.

The paper authored by Zawidzka and Zawidzki [4] presents a concept of an extremely simple planar manipulator, which is composed of 24 congruent modules. The control of the manipulator is executed by placing it manually in desired configurations and interpolating the intermediate transitions. The preliminary results are promising and show that the functionality and precision of this simple manipulator could be sufficient for such tasks as visual inspection, provision of survival supplies or placing explosives.

Similarly to the case of the first Special Issue on Engineering Optimization published in Computer Assisted Methods in Engineering and Science (CAMES) in 2020 [5] where we served as guest editors, we sincerely hope that the focus of this second issue contributes significantly to the state of the art of the highly active research area of engineering optimization and addresses the needs of CAMES's wide community of academic and industrial researchers and practitioners.

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References

1. I. Namatēvs, K. Sudars, A. Dobrājs, Interpretability versus Explainability: Classification for Understanding Deep Learning Systems and Models, *Computer Assisted Methods in Engineering and Science*, **29**(4): 297–356, 2022, doi: 10.24423/cames.518.

2. M. Bruggi, V. Laghi, T. Trombetti, Optimal Design of Wire-and-Arc Additively Manufactured I-Beams for Prescribed Deflection, *Computer Assisted Methods in Engineering and Science*, **29**(4): 357–378, 2022, doi: 10.24423/cames.469.

3. J. Szklarski, Multi-robot Coverage for Autonomous Industrial Floor Cleaners, *Computer Assisted Methods in Engineering and Science*, **29**(4): 379–395, 2022, doi: 10.24423/cames.581.

4. E. Zawidzka, M. Zawidzki, Discrete (two-state) modular hyper-redundant planar manipulator, *Computer Assisted Methods in Engineering and Science*, **29**(4): 397–407, 2022, doi: 10.24423/cames.550.

5. B. Błachowski, P. Tauzowski, Preface, *Computer Assisted Methods in Engineering and Science*, **27**(2–3): 89–91, 2020, https://cames.ippt.pan.pl/index.php/cames/article/view/304.