Computational Intelligence and Data Mining in Sports

Iztok Fister [†] , Iztok Fister, Jr. ^{*,†}

Faculty of Electrical Engineering and Computer Science, University of Maribor, Koroška Cesta 46,
2000 Maribor, Slovenia; iztok@iztok-jr-fister.eu

* Correspondence: iztok.fister@um.si or iztok.fister1@um.si; Tel.: +386-(2)-22-07-420

† Both authors contributed equally to this work.

1. Editorial

Sport can be viewed from two standpoints: professional and recreational. The first standpoint is connected with the industrial capitalist society, where the only goal is to win at all costs. Usually, this leads professional athletes to excessive behavior, such as dealing with drugs, betting scandals, or gambling. The second standpoint is more positive, because it is devoted to mass sports. Indeed, the biggest problem of modern society is its sedentary lifestyle, which is reflected in obesity and loss of fitness. This trend is especially present in young generations.

Sport has a huge potential to eliminate these negative effects of modern society. Being involved in sports typically also demands sacrifice from potential athletes. This does not concern only the time taken for training, but it is also connected with the costs of hiring sports facilities in team sports or sport trainers, particularly in individual sports. However, the last concern can be reduced with the development of modern technologies. Nowadays, mobile wearable devices (e.g., Garmin and Polar) provide information needed for analyzing the performance achieved by athletes in training. Moreover, new algorithms and methods in computational intelligence and data mining allow an intelligent mode of evaluating the progress of athletes in all phases of sports training [1].

This Special Issue is focused on computational intelligence and data mining in various sports. The aim of this was to compile the latest achievements in this area and to open a forum where individuals from academia and the sports industry can find solutions to the problems arising in sport.

Overall, this Special Issue attracted 31 submissions. After rigorous peer review, 13 papers were accepted; thus, the acceptance rate for this Special Issue was 42%. The accepted papers cover many interesting domains as well as applications of computational intelligence in sports. The following areas are covered in this collection:

- Methods for the classification of similar sports images [2];
- Design and development of decision support systems in soccer [3–7];
- Analyses of the performance evolution of match play styles in basketball [8];
- Development of models to rank teams in a sports league [9];
- Methods for match outcome prediction [10,11];
- Design and implementation of real-time athlete support systems [12];
- Sports analytics in basketball [13];
- Smart sport training [14].

The variety of papers submitted to the Special Issue confirmed our assumption that artificial intelligence, to which computational intelligence also belongs, will change the world of sports [15], especially in the sense of the following topics: artificial augmented coaching; training and performance improvement; maintaining health, fitness, and safety; and predicting match outcomes. The papers included in this Special Issue cover all of the aforementioned topics.

Citation: Fister, I.; Fister I., Jr. Computational Intelligence and Data Mining in Sports. *Appl. Sci.* **2021**, *11*, 2637. <https://doi.org/10.3390/app11062637>

Received: 7 March 2021

Accepted: 15 March 2021

Published: 16 March 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Funding: This research received no external funding.

Acknowledgments: We express our gratitude to the reviewers and the whole Editorial team. Special thanks also go to the Sharon Wang, who helped us in managing this Special Issue.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Fister, I.; Fister, I., Jr.; Fister, D. *Computational Intelligence in Sports*; Springer: Berlin/Heidelberg, Germany, 2019.
2. Podgorelec, V.; Pečnik, Š.; Vrbančič, G. Classification of Similar Sports Images Using Convolutional Neural Network with Hyper-Parameter Optimization. *Appl. Sci.* **2020**, *10*, 8494. [[CrossRef](#)]
3. Hvattum, L.M. Offensive and Defensive Plus–Minus Player Ratings for Soccer. *Appl. Sci.* **2020**, *10*, 7345. [[CrossRef](#)]
4. Gimenez, J.V.; Jimenez-Linares, L.; Garcia-Unanue, J.; Sanchez-Sanchez, J.; Gallardo, L.; Felipe, J.L. Analyse Success Model of Split Time and Cut-Off Point Values of Physical Demands to Keep Category in Semi-Professional Football Players. *Appl. Sci.* **2020**, *10*, 5299. [[CrossRef](#)]
5. Iskandaryan, D.; Ramos, F.; Palinggi, D.A.; Trilles, S. The Effect of Weather in Soccer Results: An Approach Using Machine Learning Techniques. *Appl. Sci.* **2020**, *10*, 6750. [[CrossRef](#)]
6. Vallance, E.; Sutton-Charani, N.; Imoussaten, A.; Montmain, J.; Perrey, S. Combining Internal-and External-Training-Loads to Predict Non-Contact Injuries in Soccer. *Appl. Sci.* **2020**, *10*, 5261. [[CrossRef](#)]
7. Rossi, A.; Perri, E.; Pappalardo, L.; Cintia, P.; Iaia, F.M. Relationship between External and Internal Workloads in Elite Soccer Players: Comparison between Rate of Perceived Exertion and Training Load. *Appl. Sci.* **2019**, *9*, 5174. [[CrossRef](#)]
8. Gómez, M.Á.; Medina, R.; Leicht, A.S.; Zhang, S.; Vaquera, A. The Performance Evolution of Match Play Styles in the Spanish Professional Basketball League. *Appl. Sci.* **2020**, *10*, 7056. [[CrossRef](#)]
9. Shi, J.; Tian, X.Y. Learning to Rank Sports Teams on a Graph. *Appl. Sci.* **2020**, *10*, 5833. [[CrossRef](#)]
10. Hsu, Y.C. Using Machine Learning and Candlestick Patterns to Predict the Outcomes of American Football Games. *Appl. Sci.* **2020**, *10*, 4484. [[CrossRef](#)]
11. Zou, Q.; Song, K.; Shi, J. A Bayesian In-Play Prediction Model for Association Football Outcomes. *Appl. Sci.* **2020**, *10*, 2904. [[CrossRef](#)]
12. Öricü, S.; Selek, M. Design and validation of rule-based expert system by using kinect V2 for real-time athlete support. *Appl. Sci.* **2020**, *10*, 611. [[CrossRef](#)]
13. Tian, C.; De Silva, V.; Caine, M.; Swanson, S. Use of machine learning to automate the identification of basketball strategies using whole team player tracking data. *Appl. Sci.* **2020**, *10*, 24. [[CrossRef](#)]
14. Rajšp, A.; Fister, I. A systematic literature review of intelligent data analysis methods for smart sport training. *Appl. Sci.* **2020**, *10*, 3013. [[CrossRef](#)]
15. Joshi, N. Here's How AI Will Change The World Of Sports! 2019. Forbes. Available online: <https://www.forbes.com/sites/cognitiveworld/2019/03/15/heres-how-ai-will-change-the-world-of-sports/> (accessed on 5 March 2021).