Editorial

Special Issue on Human and Artificial Intelligence

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Although tremendous advances have been made in recent years, many real-world problems still cannot be solved by machines alone. Hence, the integration between Human Intelligence and Artificial Intelligence (AI) is needed. However, several challenges make this integration complex. The aim of this Special Issue (SI) was to provide a large and varied collection of high-level contributions presenting novel approaches and solutions to address the above issues.

This Special Issue contains 14 papers (13 research papers and 1 review paper) that deal with various topics related to human–machine interactions and cooperation. Most of these works concern different aspects of recommender systems (RSs), which are among the most widespread decision support systems. The domains covered range from healthcare to movies and from biometrics to cultural heritage. However, there are also contributions on vocal assistants and smart interactive technologies. In detail, this Special Issue includes the following papers:

- Falconnet et al. [1] analyze an aspect relating to RSs not significantly explored to date; namely, the impact of the recommendation message design generated by the system on the user's beliefs and behavior about the system and its advice. Specifically, the authors propose a model to deeply analyze the effects of different presentation choices and discuss their possible implications.
- Bobadilla et al. [2] deal with another relevant aspect of RSs. They introduce a neural model to visually represent the relationships between users and items. This can be beneficial both to the company behind the RS to increase profit and to end users to receive explanations on a particular suggestion. The latter represents one of the main objectives of our Special Issue; namely, to facilitate cooperation and communication between humans and machines.
- Karakolis et al. [3] address a relevant problem in human–computer interaction; that is, how to obtain provider fairness in terms of user coverage and diversity in RSs considering not only the target user but all the stakeholders involved in the recommendation process. The solution proposed in the literature for this problem is in the form of an optimization problem under constraints, which in this case becomes an NP-Hard problem. The authors come up with a heuristic approach for its solution and review the formulation of the problem as proposed in the literature.
- Motamedi et al. [4] explore a personality aspect related to the users' motivations underlying their consumption of multimedia resources. They advance a machine learning-based model for predicting the eudaimonic or hedonic orientation of the target user. In the movie domain, this translates into predicting whether the user is more interested in meaningful topic content or entertainment content. This can provide a significant contribution to the realization of RSs capable of increasingly satisfying the interests and preferences of the active user.
- Ferrato et al. [5] propose an approach to gather information on the behavior of museum visitors. Data are collected using low-cost instrumentation and analyzed using convolutional neural networks. This information can be exploited by the museum

curators and staff to optimize the arrangement of the artworks and by the visitors themselves to receive suggestions of personalized itineraries based on their preferences and interests.

- Unlike some SI papers describing solutions to specific problems affecting RSs in general, Braham et al. [6] themselves propose a recommender system. Specifically, their RS exploits the combination of text-based and ontology-based methods to support developers in finding the most appropriate user interface design patterns for a given design problem. The authors also report the results of a user study showing how the testers appreciated the suggested design patterns. This study is also relevant to our Special Issue for the choice of the proposed RS domain, as the selection of the most appropriate user interface is fundamental for successful cooperation between humans and machines.

- Brunetti et al. [7] present a comprehensive and in-depth survey on the advances and potential advances in the field of smart interactive technologies. In particular, they analyze the aspects that characterize the Industry 4.0 and 5.0 visions. With their contribution, the authors highlight once again the importance of considering the human factor in the design and realization of intelligent systems, which is also the main objective of this Special Issue.

- Lu et al. [8] propose a handwriting identification method that exploits both the static features of traditional pen-and-paper writing and the dynamic features of digital writing. This method allows for classification and recognition through classic machine learning models and deep neural networks.

- Guan and Zhao [9] introduce a similarity metric to detect adversarial attacks that can undermine deep neural networks, thus limiting their application in security-critical fields. Such attacks are made by adversaries simply by adding imperceptible human perturbations to normal examples, which may prevent their correct classification and recognition. The experimental results show how adopting this metric can determine a higher ability to recognize adversarial attacks with respect to similar state-of-the-art approaches.

- Zhang et al. [10] deal with a human–computer interaction task known in the literature as visual dialog, in which an agent is trained to engage in a structured conversation on an image. They present an approach to collaboratively extract information related to questions by analyzing the dialog history through coding at different granularities. The experimental results of this study on public online datasets allow us to develop increasingly effective AI-based assistants capable, for example, of helping visually impaired people to understand the content of digital images.

- Carmichael et al. [11] explore another compelling aspect of human–computer interaction systems. They analyze the impact of information disclosure nudges on the behavior of chatbot users. Based on the results of a user study, they also propose ways to make users more aware of their disclosure behavior while interacting with chatbots.

- Shin et al. [12] introduce a machine learning-based model for classifying individuals as adults or children based on handwritten text and patterns collected via a pen tablet. This model first identifies the most predictive features through a sequential forward floating selection algorithm and then performs the classification process through random forest and support vector machines. The experimental results reported in the article demonstrate the reliability of the proposed model.

- Spagnoli et al. [13] propose an approach based on semi-automatic segmentation tools and machine learning algorithms to predict the severity of SARS-CoV-2 infection from the analysis of chest computed tomography images. Such a system can support physicians in identifying patients most at risk, demonstrating how the integration of Human Intelligence and Artificial Intelligence can improve the prognostic evaluation and treatment of patients affected by COVID-19 and similar diseases.

- In the context of decision support systems supporting healthcare, it is essential to retrieve all the relevant information to best assist users with medical information needs.

Di Nunzio and Faggioli [14] address this problem by proposing an intent-aware gain metric to be used to identify the most promising query reformulation during a search session in a Consumer Health Search system. These systems represent one of the most representative examples in which Human Intelligence and Artificial Intelligence must combine and complement each other to achieve the final goal.

In summary, each paper included in this Special Issue represents a step towards a future with human–machine interactions and cooperation. We hope the readers enjoy reading these articles and may find inspiration for their research activities.

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

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