Preface

The invention of hybrid intelligent methods is a very active research area in artificial intelligence (AI). The aim is to create hybrid methods that benefit from each of their components. It is generally believed that complex problems can be easily solved with hybrid methods. By "hybrid," we mean any kind of combined use (either tight or loose) of distinct intelligent methods toward solving a problem, either specific or general. In this sense, it is used as synonymous with "integrated."

Some of the existing efforts try to make hybrids of what are called soft computing methods (fuzzy logic, neural networks, and genetic algorithms) either among themselves or with more traditional AI methods, such as logic and rules. Another stream of efforts integrates case-based reasoning or machine learning with soft computing or traditional AI methods. Yet another integrates agent-based approaches with logic and non-symbolic approaches. Some of the combinations have been quite important and more extensively used, like neuro-symbolic methods, neuro-fuzzy methods, and methods combining rule-based and case-based reasoning. However, there are other combinations that are still under investigation, such as those related to the Semantic Web and Big Data areas. For example, the recently emerged deep learning architectures or methods are also hybrid by nature. In some cases, integrations are based on first principles, creating hybrid models, whereas in other cases they are created in the context of solving problems leading to systems or applications.

Important topics of the above area are (but not limited to) the following:

- Case-Based Reasoning Integrations
- Ensemble Learning, Ensemble Methods
- Evolutionary Algorithms Integrations
- Evolutionary Neural Systems
- Fuzzy-Evolutionary Systems
- Semantic Web Technologies Integrations
- Hybrid Approaches for the Web
- Hybrid Knowledge Representation Approaches/Systems
- Hybrid and Distributed Ontologies

- Information Fusion Techniques for Hybrid Intelligent Systems
- Integrations of Neural Networks
- Integrations of Statistical and Symbolic AI Approaches
- Intelligent Agents Integrations
- Machine Learning Combinations
- Neuro-Fuzzy Approaches/Systems
- Swarm Intelligence Methods Integrations
- Applications of Combinations of Intelligent Methods to
  - Biology and Bioinformatics
  - Education and Distance Learning
  - Medicine and Health Care
  - Multimodal Human–Computer Interaction
  - Natural Language Processing and Understanding
  - Planning, Scheduling, Search, and Optimization
  - Robotics
  - Social Networks

This volume includes extended and revised versions of some of the papers presented in the 6th International Workshop on Combinations of Intelligent Methods and Applications (CIMA 2016) and also papers submitted especially for this volume after a CFP. CIMA 2016 was held in conjunction with the 22nd European Conference on Artificial Intelligence (ECAI 2016), August 30, 2016, The Hague, Holland. Papers went through a peer review process by the CIMA-16 program committee members.

Giannopoulos et al. present results on using two deep learning methods (GoogleNet and AlexNet) on facial expression recognition. The paper of Haque et al. presents results on how communication model affects robotics swarm performance. Jabreel et al. introduce and experiment with a target-dependent sentiment analysis approach for tweets. Maniak et al. present a hybrid approach used for the modeling and prediction of taxi usage in the context of smart cities. The paper of Mason et al. introduces a reinforcement learning approach combining a Markov decision process and quantification verification to restrict an agent's behavior at a safe level. Mosca and Magoulas propose a method for approximating an ensemble of deep neural networks by a single deep neural network. Finally, Teppan and Friedrich present a constraint answer programming solver and investigate its performance through its application to two manufacturing problems.

We would like to express our appreciation to all the authors of submitted papers as well as to the members of CIMA 2016 program committee for their excellent review work.

We hope that this kind of post-proceedings will be useful to both researchers and developers.

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http://www.springer.com/978-3-319-66789-8

Advances in Hybridization of Intelligent Methods
Models, Systems and Applications
Hatzilygeroudis, I.; Palade, V. (Eds.)
2018, IX, 147 p. 44 illus., 23 illus. in color., Hardcover
ISBN: 978-3-319-66789-8