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Editorial

Special issue on hybrid artificial intelligence systems from the HAIS 2017 conference – Editorial

The seven papers included in this special issue represent a selection of extended contributions presented at the 12th International Conference on Hybrid Artificial Intelligent Systems, HAIS 2017 held in Logroño, Spain, June 21st–23rd, 2017, and organized by University of la Rioja and BISITE research group.

The International Conference on Hybrid Artificial Intelligence Systems (HAIS 2017) has become a unique, established and broad interdisciplinary forum for researchers and practitioners who are involved in developing and applying symbolic and sub-symbolic techniques aimed at the construction of highly robust and reliable problem-solving techniques to present the most relevant achievements in this field.

The papers are organized as follows.

In the first contribution, Garmendia et al. present a novel approach for predicting the occurrence of the readmission event, where authors are concerned with the prediction of the time until readmission, which can be studied in the framework of survival analysis. They report the performance of several neural and statistical prediction models on a large real dataset, finding approaches (weighted k-NN and regression tree based rule system) which provide a smooth approximation of the observed survival function, thus encouraging further research in this direction.

In the next contribution, by Skryjomski et al., a highly efficient parallel approach for computing the multi-label k-Nearest Neighbor classiffier on GPUs is proposed. While this method is highly effective due to its accuracy and simplicity, its computational complexity makes it prohibitive for large-scale data. Authors propose a four-step implementation that takes an advantage of the GPU architecture, allowing for an efficient execution of the multi-label k-Nearest Neighbors classifier without any loss of accuracy. Experiments carried out on a number of real and artificial benchmarks show that it is able to achieve speedups up to 200 times when compared to a sequential CPU execution, while efficiently scaling up to varying number of instances and features.

Following, Martinez-de-Pison et al. present a hybrid methodology that combines Bayesian optimization (BO) with a constrained version of the GA-PARSIMONY method to obtain parsimony models. The proposal is designed to reduce the sizeable computational effort associated with the use of GAPARSIMONY alone. The method begins with BO to obtain favorable initial model parameters. Then, with these parameters, a constrained GA-PARSIMONY is implemented to generate accurate parsimony models by using feature reduction, data transformation and parsimonious model selection. Experiments with extreme gradient boosting machines (XGBoost) and ten UCI databases demonstrated that the hybrid methodology obtains models analogous to those of GAPARSIMONY while achieving significant reductions in elapsed time in eight out of ten datasets.

The fourth contribution, by Griol et al., presents a methodology for the development of embodied conversational agents for social virtual worlds. The agents provide multimodal communication with their users in which speech interaction is included. Authors proposal combines different techniques related to Artificial Intelligence, Natural Language Processing, Affective Computing, and User Modeling. A statistical methodology has been developed to model the system conversational behavior, which is learned from an initial corpus and improved with the knowledge acquired from the successive interactions. In addition, the selection of the next system response is adapted considering information stored into user's profiles and also the emotional contents detected in the user's utterances.

The subsequent contribution, by Rico et al., focuses on a decision support system to decide the placement of a specific safety device designed in a research project. This approach includes a feature selection stage, a model learning stage and the deployment stage. Decision models learn from real datasets with information related with accidents, classifying the samples as Fatal, Severe or Slight injury. Also, a case based risk index is proposed, so samples within the same label can be sorted. Therefore, in the deployment stage, each possible location is ranked and the user gets a feedback of the suitability of each of them to be considered for placing the intelligent safety device.

In the sixth work, Pérez et al. propose an improvement to the hybrid methodology for orbit propagation, based on fitting new hybrid propagators from others previously developed for nearby initial conditions, which avoids the need for both the control data and the tuning process, and achieves comparable results.

The final contribution, by Kim et al., exploits various deep convolutional neural networks (CNN) architectures in convolutional neural-based learning classifier systems (CN-LCS) combining the CNN and LCS to explore the possibility of a CN-LCS. By using various CNNs as an action of a classifier in an N-LCS, better classification accuracy can be obtained, and classifier can be optimized. Experimental results show that authors models achieve the higher performance than N-LCS for database intrusion detection as well as two other datasets and extract effective features from deep representation by projecting data samples learned by several deep CNN models into the feature space.

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we hope the reader will share our joy and find this special issue very useful.

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