Guest Editorial Preface

Special Issue on Deep Learning in Big Data and the Internet of Things Problems

Hadj Ahmed Bouarara, GeCoDe Laboratory, University of Dr. Tahar Moulay, Saida, Algeria

Soufiane Boulehouache, LIRE Laboratory, A. Mehri Constantine 2 University, Algeria & 20 Août 1955-Skikda University, Algeria

INTRODUCTION

The evolution of IoT is rapid: since 2014, the number of connected objects has exceeded the number of connected humans and it is expected that 50 billion objects will be connected in 2020. It was present in many types of applications: networks, health, home, city, industry, television, automobile, etc. IoT and Big Data are buzzing the technology world for quite a time now, and these are no longer a "*nice to have"* technology but a necessity. There is a drive to adopt big data within organizations, which has triggered the use of big data analysis tremendously in the past few years. Hence, businesses are also rapidly catching on to what they need for it (Tarik et al., 2017; Kalsi et al., 2018).

Over the last years, deep learning methods have been shown to outperform previous state-of-the-art machine learning techniques in several fields. This philosophy, which represents a trending area of research and current affairs, has significantly improved results in many real domains such as computer vision, speech recognition and machine translation. Deep learning techniques make it possible. By using data, it can solve many problems in many areas of the economy, such as health, transport, trade, finance and energy. The concept of deep learning is to dig large volumes of data to automatically identify patterns and extract features from complex unsupervised data without the involvement of humans, which makes it an important tool for Big Data analysis (ur Rehman et al, 2016; Bouarara et al., 2019).

After a comprehensive review process, four papers on this special subject have been accepted for publication. In contrast, this special issue brings together an extended version of few significant articles from The International Conference on Theoretical and Applicative Aspects of Computer Science held in 20 Août 1955 University, Skikda, Algeria from 15-16 December 2019.

CONTENT OF THIS ISSUE

In this regard, the first article talks about a comprehensive survey of bio-inspired metaheuristics, their classification, principals, algorithms, their application domains and a comparison between them.

The second paper introduces a collaborative and distributed method for botnet detection in massive networks such as the Internet of Things (IoT) and Wide Area Networks (WAN). The method is model-based and designed as a multi-agent system where the agents are situated on IoT devices. Every agent, analysis the events' entropies, then exchanges its decision with its neighbors aiming at establishing global decision if a botnet is ongoing to be installed within the network or not. Decisions

spread over the network where a dominant consensual decision can emerge. Furthermore, the botnet is detected at an early stage of its life-cycle. Conducted experiments have shown that the proposed approach is well suited for botnet detection in IoT and WAN.

The third paper discusses three supervised machine learning algorithms: Naïve Bayes, K-Nearest Neighbor (KNN), Decision Tree in order to compare their overall accuracy, precisions as well as recall values, F-Measure, Number of tweets correctly classified, Number of tweets incorrectly classified and Execution Time.

The last article introduces an approach based on a semi-supervised learning model, which is the self-training with a deep learning algorithm to predict missing classes from labeled and unlabeled data. In order to assess the performance of the proposed approach, two datasets are used with four performance measures: Precision, Recall, F-measure and Area Under the ROC Curve (AUC).

On a final note, it is our hope that these contributions can help researchers interested in deep learning, big data, IoT, bio-inspiration and, of course—a theoretical and practical understanding of collective and organizational intelligence.

Hadj Ahmed Bouarara
Soufiane Boulehouache
Guest Editors
IJOCI

REFERENCES

Bouarara, H. A., Hamou, R. M., & Amine, A. (2015). Clustering of Human Gestures Images Using 3D Cellular Automata and N-Gram Pixels with a Visualisation aspect. *International Journal of Organizational and Collective Intelligence*, *5*(4), 35–60. doi:10.4018/IJOCI.2015100104

Kalsi, S., Kaur, H., & Chang, V. (2018). DNA cryptography and deep learning using genetic algorithm with NW algorithm for key generation. *Journal of Medical Systems*, *42*(1), 17. doi:10.1007/s10916-017-0851-z PMID:29204890

Rehman, M. H., Chang, V., Batool, A., & Wah, T. Y. (2016). Big data reduction framework for value creation in sustainable enterprises. *International Journal of Information Management, 36*(6), 917-928.

Tarik, B., Mahmoud, D. D., & Zakaria, E. (2017). Classifying web pages by aimed nation using machine learning. *International Journal of Organizational and Collective Intelligence*, *7*(1), 20–35. doi:10.4018/IJOCI.2017010102