Guest Editorial Preface

Special Issue on Artificial Intelligence for eHealth

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Artificial intelligence has grown extensively in recent times and is changing the healthcare industry from many perspectives: Clinical Diagnosis, suggests treatment and follow up. Clinical Decision Support (CDS) is a major topic of AI in medicine to assist clinicians at point of care. Existing techniques used for processing health data can be broadly classified into two categories: (a) non-Artificial Intelligence (AI) systems and (b) Artificial Intelligence systems. Even though non-AI techniques are less complex in nature, most of the systems suffer from the drawbacks of inaccuracy and lack of convergence. Hence, these systems are generally replaced by AI based systems which are much superior to the conventional systems. AI techniques are mostly hybrid in nature and include Artificial Neural Networks (ANN), fuzzy theory, and evolutionary algorithms. Though most of the techniques are theoretically sound, the potential of these techniques is not fully explored for practical applications. Many of the computational applications still depend on non-AI systems, which limit their practical usage.

CDS can be Artificial Intelligence-based, where the AI areas involved are inference and logics and non-Artificial Intelligence-based, where machine learning is used. CDS can support all aspects of clinical tasks, but, to be effective, it must be properly integrated within the clinical workflow, as well as with health records. A typical application of CDS is a Computer Aided Diagnosis (CAD) to assist doctors in the interpretation of medical images. CAD involves, not only AI, but also Computer Vision, Signal Processing and specific medical aspects. CADs find application in breast cancer, lung cancer, colon cancer, coronary artery disease, Alzheimer's disease and many others.

This special issue address broad challenges on both theoretical and application aspects of AI in eHealth, biomedical, health informatics, and medical image analysis. From a total of twenty-five papers submitted to this special issue, five papers were selected based on the reviews. Each paper was reviewed by at least three reviewers and went through at least two rounds of reviews. The brief contributions of these papers are discussed below.

The first paper by Abhinav Juneja et al. proposes supervised learning using support vector machines for the classification of Cardiac diseases. The concept of hyper parameter tuning has been used in order to improvise the prediction accuracy of the model. Further, it compares the prediction results obtained with hyper parameter tuning to the traditional SVM classifier and it is observed that there is a considerable improvement in the prediction score using the proposed methodology.

The second paper by Pradeep Kumar Singh et al. presents the robust and secure watermarking approach using Paillier homomorphic cryptosystem with Arnold transformation. Sharing of digital media over Internet is become more easier due to content authentication, and security provided by digital watermarking. The proposed algorithm is tested with different watermarking parameters like PSNR and NCC, it achieves good results in comparison to previous discussed algorithms. The proposed work has shown the capability to handle various kinds of attacks as well.

In the next paper by Law Kumar Singh et al. presents the artificial intelligence-based diagnosis model that supports the medical practitioners to recognize the presence of Glaucoma with enhanced accuracy. This work uses OCT images (healthy eye and glaucomatous eye) due to its numerous advantages over fundus images by extracting 45 features. A self-customized algorithm for ILM, RPE, Disc Diameter, CDR, and Cup Diameter feature extraction has been developed. The results show that the proposed work helps in early identification of glaucoma.

Manoj Kumar et al. collects the unstructured research data from a frequently used social media network i.e. Twitter by using a twitter application program interface (API) stream. Then, different machine classification algorithms (supervised, unsupervised and reinforcement) like Decision Trees (DT), Neural Networks (NN), Support Vector Machines (SVM), Naive Bayes (NB), Linear Regression (LR) and k-Nearest Neighbor (K-NN) from the collected research data set has been implemented. The comparison of different machine learning classification algorithms is concluded and finally, this research work concludes that the Support Vector Machine (SVM) classification algorithm is most accurate compared to other machine classification algorithms. The technique is well suited for the analysis of eHealth related datasets.

The biological systems are shifting towards automation and E-health programs that deal with free ECG check-up camps, Intensive Care Unit (ICU), Emergencies, and mobile fast track devices. Inspired by supervised learning used in these applications, the final paper of this special issue by Ritu Singh et al. proposed a research aims at lossless feature extraction, compatible feature reduction, efficient and effective classification to develop application-specific arrhythmia detection modules instead of a generalized system for different medical requirements. A hybrid approach consisting of Dual-Tree Complex Wavelet Transform (DTCWT) double decomposition and the linear discriminant analysis (LDA) integrates to have a compact input ECG feature dataset for classifiers like Support Vector Machine (SVM), Extreme Learning Machine (ELM), and K-Nearest Neighbor (KNN). The performance evaluation validates on the MIT/BIH database.

To conclude, this special issue publishes five papers out of the total of twenty-five submitted papers. The guest editors hope that the research contributions and findings in this special issue would benefit the readers in terms of enhancing their knowledge and encouraging them to work on various aspects of Artificial Intelligence for eHealth.

We would like to express our sincere thanks to the editor-in-chief Prof. Joel J.P.C. Rodrigues for allowing us to organize this special issue. The editorial office staffs are excellent and thanks for their support. We are also thankful to all the authors who made this special issue possible, and to the reviewers for their thoughtful contributions.