

Guest Editorial Preface

Special Issue on Smart E-Health and Medical Communications in the Era of Healthcare 4.0

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Healthcare Industry is still in its infancy as it signified its start in the year 1970. The efforts made then were fundamental, and assets were constrained, so, this stage was entitled as Healthcare 1.0. Consequent advancement of information technology (IT) field and development of medical technologies such as tracking system, medical imaging conveyed Healthcare 2.0 in the picture. The initiation of new and compelling treatment strategies has begun with having data processing systems and computational techniques. In this directions, Healthcare 3.0 come up in mainstream because of the usage of electronic health records in the time of 2006–2015. This phase has embraced the electronic health records to help specialists to get significant data on time. Strong communication technologies and artificial intelligence (AI) in Healthcare system provide efficient and useful analytic to specialists/physician. These value-based systems empower Healthcare Industry in providing well-informed decisions with the quality of service (QoS). Medical service in the USA is considered as Healthcare 4.0 where 90% of the Healthcare system has been intended to turn towards the value-based system.

E-Health and Medical Communications is one the dominant area of research worldwide. There are number of technologies emerged in recent years which has improved the healthcare services and assisted the medical practitioner in different ways. These emerging technologies are able to build better communication and are able to develop real time response systems to help patients during several critical medical situations. On the other side with the help of data analytics and decision support systems doctors are able to understand several symptoms of diseases and can analyze several images in more accurate way.

This special issue is addressing one of the most overlooked practical, methodological, and moral questions in any nations' journeys smart e-Health and secure medical communications. We have received total 29 submissions for this special issue across the globe and after the rigorous review process, only 06 manuscripts have been accepted to be published for this special issue. Details of all accepted manuscripts are as follows.

“SLAMMP Framework for Cloud Resource Management and its Impact on Healthcare Computational Techniques,” by V. Kumar and M. Bhavsar proposes a SLAMMP framework that shows how the resources are managed by using the concept of Reinforcement Learning (RL)

and Long Short Term Memory (LSTM) for monitoring and prediction of the cloud resources for healthcare organizations. The task pattern and anti-pattern scenarios have been observed using HMM (Hidden Markov Model). These patterns will tune the SLA parameters (Service Level Agreement) using Blockchain-based Smart Contracts (SC). The result discussed here indicates that the variations in the cloud resource demand will be handled carefully using the SLAMMP framework. From the result obtained, it is identified that SLAMMP performs well compared to traditional schemes.

“Artificial Bee Colony and Deep Neural Network Based Diagnostic Model for Improving the Prediction Accuracy of Diabetes”, by Y. Kumar, A. Srivastava, and P.K. Singh proposes a diagnostic model, which is designed using artificial bee colony (ABC) algorithm and deep neural network (DNN) technique, called ABC-DNN based diagnostic model. The ABC algorithm is applied to determine the relevant features for diabetes prediction and diagnosis. While, DNN technique is adopted for the prediction and diagnosis of diabetes affected patients. The performance of proposed diagnostic model is tested over Diabetes dataset. The experimental results of the proposed ABC-DNN model is compared with DNN technique and several existing diabetes studies. It is observed that the proposed model achieves 94.74% accuracy rate using 10-fold method.

“Lung Tumor Segmentation Using Marker Controlled Watershed and Support Vector Machine,” by S. Vijh, R. Sarma, and S. Kumar uses image processing segmentation technique for detection of lung tumor and the support vector classifier learning technique for predicting stage of tumor. After performing preprocessing and segmentation the features are extracted from region of lung nodule. The classification is performed on dataset acquired from national cancer institute for the evaluation of lung cancer diagnosis. The multi class machine learning classification technique Support Vector Machine (SVM) identifies the tumor stage of lung dataset. The proposed methodology provides classification of tumor stages and improves the decision making process. The performance is evaluated by measuring the parameters namely accuracy, sensitivity and specificity.

Prediction of Environmental Pollution Using Hybrid PSO-KMeans Approach,” by M. Mahajan, A. Khanna, P. Singh, S. Yadav, and S. Gupta addressed one of the most critical problem that has significant impact on human health and ecosystem. Reliable air quality prediction can reduce the impact it has on the nearby population and ecosystem, hence improving air quality prediction is the prime objective for the society. The effectiveness of the outlier detection method and the clustering methods in turn depends on the effective and efficient choice of parameters like initial centroids and number of clusters etc. They have explored the hybrid approach combining K-Means clustering optimized with Particle Swarm Optimization (PSO) to optimize the cluster formation, thereby improving the efficiency of the prediction of the environmental pollution.

“Advanced Object Detection in Bio-Medical X ray Images for Anomaly Detection and Recognition,” by G. Modwel, A. Mehra, N. Rakesh, and K. K. Mishra performed a case study in biomedical image processing in which a methodology is proposed, which analyses the details that may be missed by doctor. The input to the algorithm is the image in the format of X-ray imaging, eventually, the output of the process is a label on the corresponding test image. The proposed method uses a convolution neural network to decide on the labels.

“RMAC: Customised MAC Protocol for Roundabout Management Using VANET for Cooperative Driving,” by H. Vats and R. Tomar proposes a new approach by use of lane change mechanism without compromising the safety of vehicles. This Intersection Side Unit (ISU)-based system will increase the capacity of roundabout utilising lane instead of cells used by researchers till now. The modular use of lane with lane change in newly designed protocol Collision Avoidance at Roundabout Algorithm (CARA), which enhances the capacity utilisation of roundabout. A new simulator ‘RoundSim’ is also developed exclusively for simulation in

Roundabout. Here, the complete frequency spectrum is divided in three frequency band each for security, lane change, and informative type of messages. The proposed approach utilizes message set with different prioritization scheme, which results in better utilization of allotted frequency spectrum.

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