

## Guest Editorial Preface

# Special issue on Security and Privacy in Healthcare 4.0

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Healthcare IT is a growth industry, and the need for guidance in regard to privacy and security is huge. With new federal incentives and penalties tied to the acts, and the implementation of Electronic Health Record (EHR) systems, medical practices and healthcare systems are implementing new software at breakneck speed. Yet privacy and security considerations are often an afterthought, putting healthcare organizations at risk of fines, damage to their reputations, and serious consequences on patient healthcare and data security and privacy.

In the last decade, large cities across the globe have begun to use technology to secure patient private information generated from smart healthcare solutions. Medical records (made up from the patient's vitals, physical signs such as weight, height, symptoms and signs) are a vital cog in providing efficient healthcare services to patients, and they have been growing with time. They are termed to be simple data points but are rather complex to handle. Various stakeholders are responsible for generating, storing and manipulating the records for the efficient usage and proper care of patients. Access should only be provided to authorized stakeholders as and when required. Electronic health records (EHRs) consist of various parameters such as clinical notes, patient listings, lab results, imaging results, and screening tests. Any change in the staff (doctors, nurses and care providers) can create problems in the proper access of EHRs pertaining to patients.

This special issue is addressing one of the most overlooked practical, methodological, and moral questions in any nations' journeys to maintain Privacy and Security in the Healthcare 4.0: Who can access the information on my EHR? How can user see the information in my record and make sure it's correct? How is it protected from loss, theft and hacking? What should user do if user think my information has been compromised? This special issue includes a detailed framework to maintain security and privacy in electronic healthcare records, and comparative case studies with respect to various performance evaluation metrics, such as privacy preservation, scalability, and Healthcare legislation. Therefore, in this special section, state-of-the art research advances in Security and Privacy in Healthcare 4.0 are presented.

We have received total 15 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.

“A Survey on Fatigue Detection of Workers using Machine Learning,” by Vikram Bali, Nisha Yadav, and Kakoli Banerjee presents a comparative study of different techniques which can be used for fatigue detection for programmers and data miners who spent lot of the time in front of computer screen. Machine learning can be used for software worker fatigue detection also but there are some factors which are specific for software workers. One of such factors is screen illumination. Screen illumination is the light of the computer screen or laptop screen that is casted on the workers face and makes it difficult for the machine learning algorithm to extract the facial features.

“Real Time Mobile-Phone Aided Melanoma Skin Lesion Detection using Triangulation Technique,” by Kumud Tiwari, Sachin Kumar, and R. Tiwari proposes a mobile application having capabilities to segment skin lesions in dermoscopy images using triangulation method and categorize them into malignant or benign lesions through a supervised method which is convolution neural network (CNN). This mobile application will make the skin cancer detection non-invasive which doesn't require any laboratory testing making the detection less time consuming and inexpensive with detection accuracy of 81%.

“A Rule Based Monitoring System for Accurate Prediction of Diabetes: Monitoring System for Diabetes,” by Yugal Kumar, Anand Srivastava, Pradeep Singh presents a diabetes monitoring system to determine the risk of diabetes based on the personal health record of patients. Several rules are designed to accurate prediction of diabetes disease. The effectiveness of diabetes monitoring system is tested on a set of two hundred forty people. Simulation results are compared with well-known techniques available in literature for diabetes prediction. It is stated that proposed monitoring system obtains 90.41% accuracy rate as compared with other techniques.

“Monitoring IaaS Cloud for HealthCare Systems: Healthcare information management and cloud resources utilization,” by Vivek Prasad, Madhuri Bhavsar discussed the contract-based relationship between the Cloud Service Provider and the actors of healthcare systems by means of Service Level Agreements (SLAs). The variation in both demand and supply within the healthcare information affects the use of Information Technology. To deal with the aforementioned problems; reinforcement learning mechanism along with the metrics was used by the authors and experimented with the various dynamics of workload to deliver services with quality assurance.

“Brain Tumor Detection based on Multilevel 2D Histogram Image Segmentation using DEWO Optimization Algorithm,” by Sumit Kumar, Garima Vig, Sapna Varshney, Priti Bansal present a study in-between Renyi entropy based multilevel image segmentation using combination of Differential Evolution and Whale Optimization algorithm to perform brain tumor detection. Authors compared the proposed approach with some prominent meta heuristic algorithms in recent past using between-class variance and Tsallis entropy functions algorithms to validate the efficiency of proposed approach. The proposed method of image segmentation was able to achieve better results from all the other meta-heuristic algorithms in every entropy function-based segmentation performed for brain MR image.

“Qualitative Analysis of 3D Routing Algorithms in  $3 \times 3 \times 3$  Mesh NoC Topology Under Varying Load,” by Vivek Sehgal and Nidhi Syal presents a qualitative analysis of 3 D routing algorithm in  $3 \times 3 \times 3$  Mesh NOC Topology. This comparison has the quality parameters like Total packet received, total received flits, Global average delay(cycles), Global average throughput (flits/cycle), Throughput (flits/cycle/IP), Max delay (cycles), Total energy (J), Avg power (J/cycle), Avg power per router (J/cycle) and Avg waiting time in each buffer.

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