

Application of Federated Learning in the Health Care Sector for Malware Detection and Mitigation Using Software-Defined Networking Approach

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Abstract : This research takes us forward with the concepts of Federated Learning and Software-Defined Networking (SDN) to introduce an efficient malware detection technique and provide a mitigation mechanism to give birth to a resilient and automated healthcare sector network system by also adding the feature of extended privacy preservation. Due to the daily transformation of new malware attacks on hospital Integrated Clinical Environment (ICEs), the healthcare industry is at an undefinable peak of never knowing its continuity direction. The state of blindness by the array of indispensable opportunities that new medical device inventions and their connected coordination offer daily, a factor that should be focused driven is not yet entirely understood by most healthcare operators and patients. This solution has the involvement of four clients in the form of hospital networks to build up the federated learning experimentation architectural structure with different geographical participation to reach the most reasonable accuracy rate with privacy preservation. While the logistic regression with cross-entropy conveys the detection, SDN comes in handy in the second half of the research to stack up the initial development phases of the system with malware mitigation based on policy implementation. The overall evaluation sums up with a system that proves the accuracy with the added privacy. It is no longer needed to continue with traditional centralized systems that offer almost everything but not privacy.

Keywords : software-defined network, federated learning, privacy, integrated clinical environment, decentralized learning, malware detection, malware mitigation

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