Chapter 11
Leveraging Machine Unlearning for Better Medical Care and Data Protection in Healthcare 6.0

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ABSTRACT

Machine Learning (ML), a key component of modern technology, evolved from

DOI: 10.4018/979-8-3693-7210-4.ch011

Alan Turing's 1950s concepts and the Turing Test. Introduced in 1959, ML enables computers to perform tasks by learning from data rather than explicit programming. It includes supervised, unsupervised, semi-supervised, and reinforcement learning. As ML integrated into various industries, Machine Unlearning (MU) emerged to address data privacy and security. MU involves removing specific data points' influence from a trained model without complete retraining, ensuring sensitive information is efficiently erased while maintaining model integrity.

BACKGROUND

Healthcare data includes information collected from patients such as diagnoses, medications, treatment plans and test results. This data is stored and analyzed to provide effective tailored healthcare to the patients.

As healthcare professionals handle vast amounts of data, robust data processing and management tools are essential for their work (Unlu, 2024). These sophisticated data analysis tools process vast data using AI based technologies and machine learning practices to get effective and accurate results. In this era of advanced data analytics and AI applications in healthcare, the concept of unlearning is essential. As healthcare data analysis models are exposed to new data and contexts, they need the ability to discard outdated information to prevent biases and inaccuracies. This is akin to Kuhn's notion that scientific progress necessitates the abandonment of old paradigms to adopt new, more effective ones (Kuhn, 1997). Thus, machine unlearning is not merely about data erasure; it involves re-evaluating and updating the model's framework to ensure better alignment with current realities and evidence (Alvandi, 2024).

Healthcare 6.0 focuses on integrating emerging digital technologies to improve the efficiency of healthcare delivery. A crucial component of this is understanding machine unlearning strategies, which are necessary to keep healthcare systems efficient and responsive. This chapter explores machine unlearning, including its methods, potential, and real-world applications. It seeks to provide industry leaders and healthcare professionals with the know-how to improve health analytics using innovative technologies.