

Secure Decentralized Decisions in Consolidated Hospital Systems: Intelligent Agents and Blockchain

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Abstract

Shared decision making has become a crucial solution to build a consolidated healthcare system. While there is some research in the healthcare literature discussing the advantages and disadvantages of the shared decision making, its efficiency has not been addressed quantitatively. In this paper, we propose a universal decentralized decision making architecture utilizing the Blockchain Technology and machine learning (predictive and prescriptive analytics) to address the compelling need for coordination among healthcare providers and patients in an integrated manner. The healthcare process considered is the assignment of patients to the best physicians and hospitals in consolidated hospital systems. After designing Decentralized Patients Assignment System (DPAS), the model is simulated using Agent-based models (ABM). The ABM consist of 4 agents including patient, physician, hospital and miner (assignment algorithms) which interact inside a decentralized system. The proposed mechanism introduces the importance of interoperability between healthcare agents in the decision making process created by Blockchain technology. To illustrate the model efficiency, two scenarios have been simulated and the results are compared. The results demonstrate the proposed model efficiency in terms of the assignment rate, computational time, and cost.

Keywords: Hospitals consolidation, Blockchain technology, Machine Learning, Agent-based Models

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