Blockchain in Healthcare: Securely Sharing Medical Records Across Medical Professionals and Patients

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Abstract

Blockchain technology has drawn a lot of attention as a promising breakthrough with the potential to revolutionize a number of industries, including supply chain management, healthcare, and finance. Based on Distributed Ledger Technology (DLT), blockchain has unmatched advantages, including security, immutability, efficiency, and the absence of middlemen, which can alter the power dynamics in the value chain. This paper explores the transformative potential of blockchain technology in the context of sharing medical records among hospitals. Traditional patient data exchange techniques frequently experience inefficiencies, privacy issues, and data fragmentation. The secure, open, and interoperable exchange of medical information across various healthcare organizations is made possible by the decentralized structure of blockchain, which represents a viable option. An end-to-end encrypted health record exchange system is proposed with the help of public key cryptography and key derivation function. A public blockchain acts as a secure, immutable storage for this system. This system is expected to provide channels for bilateral medical information exchange between medical professionals and patients in a confidential and secure manner.

Construct the Prediction Model for Neglected Tropical Disease Incidence and Outbreaks

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Diarrhea, a disease that is extremely sensitive to water sources, is a leading cause of child mortality and morbidity and is widespread throughout developing countries. Meanwhile, climate change, along with extreme weather phenomena, is considered one of the main reasons causing to water pollution in the near future. As a developing country located in the tropical climate belt, Vietnam has a high risk of diarrhea outbreaks, which leads to an urgent need for an early warning system for this disease. However, previous studies have only focused on predicting diarrhea incidence rates/cases. In this paper, we focus on another problem of prediction diarrhoea outbreaks for six provinces in Vietnam. Firstly, a wide range of 23 different machine learning models are thoroughly studied for the outbreak prediction task. We experimentally proves that many of these models, e.g., SVM, XGBoost, and Decision Tree, can predict outbreaks more accurate than inferring them from predicted incidence rates/cases like previous researches. Secondly, we proposed an ensemble prediction filtering layer built upon the Apriori algorithm that could eliminate 10% to 40% of the mistakenly predicted outbreaks. Finally, our work also provide a comprehensive picture on the overall performances of many different ML models on the outbreak prediction task for future research in other areas.

Application of LSTM Algorithm Combined With Stacking Technique in Machine Learning to Enhance Disease Prediction Capability

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Abstract

LSTM (Long Short-Term Memory) is a type of recurrent neural network (RNN) architecture widely used in natural language processing and other sequential data tasks. The dataset used in this research contains information about various types of diseases, each with different symptoms and manifestations. It consists of 131 million instances, representing 41 different diseases. The LSTM algorithm performed quite well, especially for datasets with high-class imbalance. Through experimentation, we found that LSTM can accurately predict a person's disease type based on the observed symptoms and manifestations with high confidence (ACC ≈ 99.6%). Furthermore, we combined LSTM with the Stacking technique (an Ensemble Learning model) to increase the predictive reliability, achieving an ACC of 100%. This research yielded superior results compared to other algorithms applied in related studies.

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Application of Deep Learning in Multi-label Chest X-ray Image Classification

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