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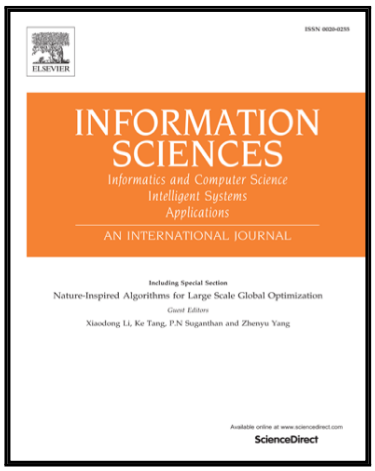

A Disease Diagnosis and Treatment Recommendation System Based on Big Data Mining and Cloud Computing

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ACCEPTED MANUSCRIPT

A Disease Diagnosis and Treatment Recommendation System Based on Big Data Mining and Cloud Computing

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Abstract

It is crucial to provide compatible treatment schemes for a disease according to various symptoms at different stages. However, most classification methods might be ineffective in accurately classifying a disease that holds the characteristics of multiple treatment stages, various symptoms, and multi-pathogenesis. Moreover, there are limited exchanges and cooperative actions in disease diagnoses and treatments between different departments and hospitals. Thus, when new diseases occur with atypical symptoms, inexperienced doctors might have difficulty in identifying them promptly and accurately. Therefore, to maximize the utilization of the advanced medical technology of developed hospitals and the rich medical knowledge of experienced doctors, a Disease Diagnosis and Treatment Recommendation System (DDTRS) is proposed in this paper. First, to effectively identify disease symptoms more accurately, a Density-Peaked Clustering Analysis (DPCA) algorithm is introduced for disease-symptom clustering. In addition, association analyses on Disease-Diagnosis (D-D) rules and Disease-Treatment (D-T) rules are conducted by the Apriori algorithm separately. The appropriate diagnosis and treatment schemes are recommended for patients and inexperienced doctors, even if they are in a limited therapeutic environment. Moreover, to reach the goals of high performance and low latency response, we implement a parallel solution for DDTRS using the Apache Spark cloud platform. Extensive experimental results demonstrate that the proposed DDTRS realizes disease-symptom clustering effectively and derives disease treatment recommendations intelligently and accurately.

Keywords: Big data mining, Cloud computing, Disease diagnosis and treatment, Recommendation system.

1. Introduction

1.1. Motivation

Technological advancements and cost reduction in medical equipment and disease diagnosis have greatly accelerated the adoption of state-of-the-art technologies in various hospitals [29, 30]. The benefits of obtaining interactive and intelligent medical service based on knowledge discovery are rapidly growing. The accurate classification of different disease symptoms is essential in helping doctors carry out compatible treatment schemes for the disease. In contrast, traditional disease classification methods usually follow naive practices based on limited disease information, which might fail to further classify a disease according to symptoms at different treatment stages. In particular, for diseases with the characteristics of multiple similar treatment stages, various symptoms, and multi-pathogenesis, the accuracy and effectiveness of traditional classification algorithms are significantly lower. Therefore, it is crucial to find suitable approaches to accurately classify disease symptoms based on inspection reports.

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