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TOWARD EFFECTIVE PLANNING AND MANAGEMENT USING PREDICTIVE ANALYTICS BASED ON RENTAL BOOK DATA OF ACADEMIC LIBRARIES

ABSTRACT

Large scale data and predictive analytics are the most challenging tasks in the field of academic data mining. Academic libraries are a great source of information and knowledge to provide a wide range of services to meet end-user requirements. Due to the rapid changes in the educational environment and availability of huge library rental book data, it is required to utilize data mining and machine learning techniques in the context of the academic library to extract and analyze underlying knowledge from rental book data, which is important to facilitate library administration to drive better future decisions to improve and manage library resources effectively. These are the following resources, such as managing future demands of the library books, selection and arrangement of the books, operational efficiency, and also improve the quality of interaction between the library and end users, etc. This work uses and analyzes a real dataset collected from the library of Jeju National University, the Republic of Korea. The dataset contains 2,211,413 rental book records including 173671 unique book records, 57203 unique numbers of the rental user, and 78 data parameters. In this project, we propose a novel model to analyze and predict library rental book data to facilitate library administration in order to plan and manage library resources effectively and provide better services to end-users. The proposed model consists of two different modules; library data analysis and prediction modules. Firstly, we use data mining techniques to analyze and extract useful underlying patterns from library rental book data, which can lead to plan and manage library resources effectively. Secondly, a novel prediction model is proposed based on Deep Neural Network (DNN), Support Vector Regressor (SVR), and Random Forest

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(RF) to predict future usage of the academic libraries rental books. The performance results of the implemented regression models are evaluated in terms of MAE, MSE, and RMSE. In this project, it is found that the DNN model performs significantly better than SVR and RF. The experimentation results show that the proposed model improves the future usage of library books to facilitate library administration to plan and manage library resources effectively. Based on the proposed model results, the academic library administration can easily plan and manage resources effectively to provide quality services to end users.