The Research on Personalized Recommendation Service of Library Based on Deep Learning

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Keywords: Library; Deep Learning; Personalized Recommendation Service

Abstract: Personalized information service is a kind of service that can meet the individual information needs of users. It provides information services according to the specific requirements of users, or actively provides information services that users may need through the analysis of their personality and usage habits. It includes personalized information search service, personalized information recommendation service and personalized information proxy service. Personalized information service is helpful for users to quickly and accurately acquire the information they need and provide convenience for users. The most critical part of personalized information service is the establishment of user interest model.

1. Introduction

Through combing and summarizing the relevant literature, it is concluded that the current hot topics of machine learning in the field of Library and information mainly focus on personalized recommendation services, intelligent information retrieval and automatic text categorization. Personalized information recommendation service is the development of information filtering technology. It means that intelligent terminals with machine learning ability recognize and analyze the records of information search, reading and browsing in user databases, then judge the potential information needs and interest preferences of users, and then make the information content that can meet the information needs or interest preferences of users at an appropriate time. The proper way to recommend it to him or her is that the essence of intelligent terminal is to guess what the user wants by combining machine learning with big data technology for the user's needs. For example, Taobao's "guess what you like" service is to determine the potential needs of users according to the past browsing traces of each Taobao user. If users have browsed a lot of information about toothpaste, towels and so on, the intelligent terminal uses machine learning technology to identify and analyze the brand, price and other information of toothpaste and towels in the database, and then paste the users with "needs". What brand and what price of household goods"label, and then combined with big data technology in the database to meet the requirements of similar goods selectively extracted and presented on the user's browsing page to achieve recommendation services.

2. Common Software Tools for Deep Learning

At present, there are many software tools based on in-depth learning. Because each software tool has different emphasis, according to different needs, such as image processing, natural language processing or financial field, it is different from person to person and different from project to adopt appropriate in-depth learning framework. Following is a brief introduction to the current in-depth learning software tools.

TensorFlow, a second generation AI system developed by Google based on DistBelief. The platform absorbs the advantages of the existing platform, which not only enables users to touch the underlying data, but also has the existing neural network module. It can enable users to realize modeling very quickly. It is a very excellent cross-border platform. The software library uses the data flow graph model to realize numerical calculation. The nodes in the flow graph represent mathematical operations and the edges represent data arrays. The platform architecture based on the

  DOI: 10.25236/etmhs.2019.220

software library is flexible. The code can run on single machine, porTable device or server without modification at one time. At the same time, it can support multi-GPU/CPU parallel training.

Keras-based deep learning Abstraction platform. Keras provides Abstraction of neural network module and process optimization in training. Keras can make users have convenient secondary development ability and add their favorite modules while quickly modeling.

The deep learning functional platform mainly includes Caffe, Torch, MXNet and CNTK. This kind of platform provides complete basic modules to support the creation and training of fast neural network model, but the disadvantage is that it is difficult for users to access these underlying operational modules.

Theano, the earliest software platform in the field of deep learning, focuses on the underlying basic operations. The platform has the following characteristics: (a) integrating NumPy's Python-based scientific computing package, which can b e used in conjunction with SciPy, a sparse matrix computing package, and is fully compatible with NumPy library functions; (b) it is easy to use GPU for acceleration and has a relatively larger acceleration ratio than CPU; (c) it has excellent reliability and speed advantages; (d) it can support dynamic C program generation; (e) it has testing and self-checking. The unit can detect and diagnose multiple types of errors easily.

It can be seen that there are many software tools based on in-depth learning, and there are many corresponding programming languages. No programming platform or language can unify the river and lake. I believe that in the future, newer and more efficient programming languages or platforms may also appear.

3. Personalized Recommendation Service of Library Based on Deep Learning

The core value of libraries is to provide better and better services for readers. Individualized service for users has always been an important part of Library services. Library personalized service recommendation based on in-depth learning is usually realized by SOM neural network clustering algorithm and Naive Bayesian algorithm. Neural network is an algorithm of deep learning, and it is also the carrier of deep learning. Zhu Guang et al. introduced SOM neural network technology into the user personalized service demand classification model to meet the different needs of different users for personalized digital information service and improve the quality of personalized digital information service. Taking Shanxi University Library as an example, Liu Aiqin and others constructed the personalized service recommendation system of university library users by clustering and optimizing the Web access behavior of library users with the help of SOM neural network clustering algorithm. The personalized recommendation of resources was realized according to users'needs, and the service quality of library was improved. In order to provide better personalized recommendation service for users, libraries can construct user models: firstly, using machine learning, data mining and other technologies to mine user behavior data, collect user data; after information extraction, feature extraction and selection, information filtering, analyze user data. Secondly, support vector machine and Bayesian network, decision tree and other machine learning algorithms are used to classify the features and mine user behavior in depth. Finally, the concept lattice and other analysis tools are used to process information, analyze user needs, and provide corresponding services for readers.

4. Construction and analysis of personalized recommendation service systems

Based on the model optimization training results of SOM neural network, the personalized recommendation service system of university library is constructed, as shown in Figure 1. Clustering results reveal the implicit rules of users'multiple Web access data, which need to be further integrated with users and existing resources of Libraries in personalized recommendation. The system architecture includes three parts: data layer, network layer and application layer. Among them, the data layer mainly completes all kinds of data integration operations, and encapsulates the corresponding algorithms to provide support for data invocation and calculation in the network layer. Web access data is convenient for users to view historical access records; user

feature information database integrates user-related information and then identifies users; clustering result data description describes the results of SOM neural network clustering algorithm in computer language, and provides support for resource retrieval and personalized recommendation together with resource database, and improves the matching efficiency of entity information services. Accuracy. The network layer is the bridge connecting the data layer and the application layer. It matches the user's retrieval data and reads the filtering results from the data layer with the help of corresponding algorithms. At the same time, the data layer also carries out relevant algorithms and database revision operations to meet user needs. The application layer implements the visualized interactive service of recommendation of related resources: the user input data is transmitted to the network layer for corresponding calculation, and the results are output in visual language to provide personalized Resource Recommendation Service for users; at the same time, the user accesses relevant Web data and subsequently transmits it to the lower layer, which facilitates data adjustment at the network layer and ensures the reliability of the system. The whole personalized recommendation service process is coordinated by data layer, network layer and application layer.

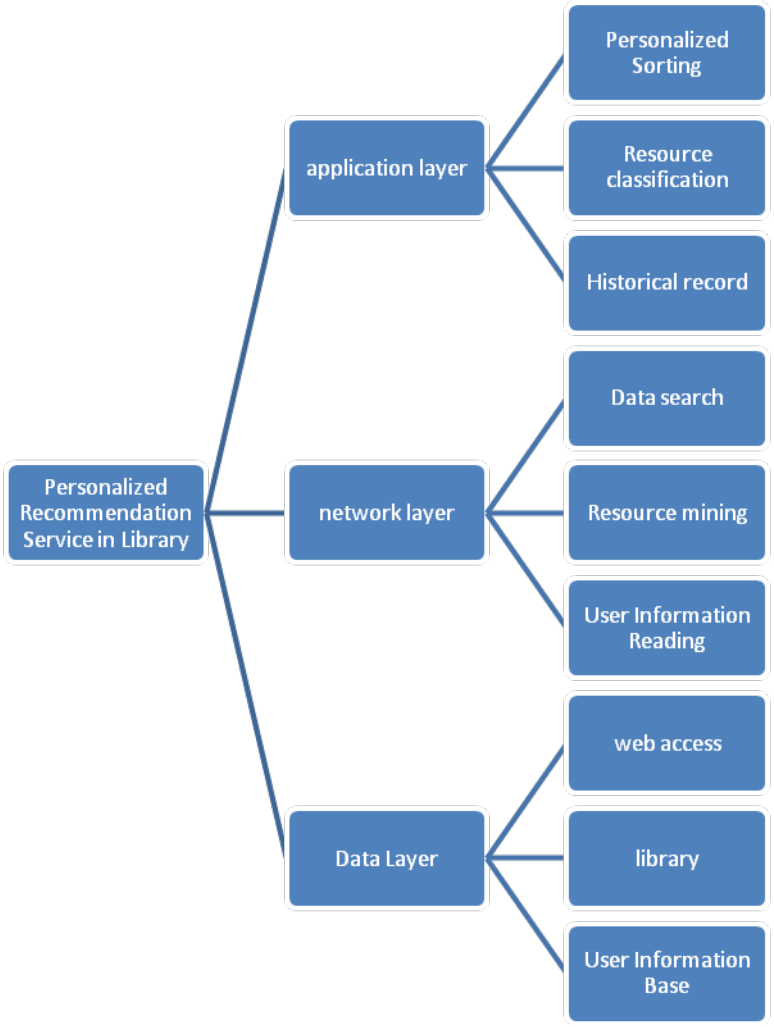

Fig.1. Architecture of Personalized Recommendation Service System in University Library

5. Conclusion

The continuous development of artificial intelligence has brought earth-shaking changes to human society, and the application fields of artificial intelligence are more and more. As one of the hottest technologies in the field of machine learning, in-depth learning has shown great prospects in many fields. Deep learning enriches and deepens the concept of library service and information retrieval theory. The use of intelligent equipment and technology has realized the optimization

management of Library resources, the saving of human resources and the innovation of service mode. The service mode based on in-depth learning will become an important way of Library service, will be welcomed by library users, and has a broad prospect of development. Deep learning is a frontier subject in the field of artificial intelligence, and it is also a hot research topic in scientific research institutions and enterprises. However, from the current research results and enterprise products, the application of in-depth learning is not yet mature, the application in the field of libraries still needs to be explored, and there is still a huge potential and development space in the field of libraries.

Acknowledgement

In this paper, the research was sponsored by the Xi'an Peihua University's school-level scientific research project in 2018, the topic is a research project of Library Personalized Recommendation System Based on in-depth learning,(Project No. PHKT18013).

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