

PRELIMINARY DISCUSSION ON MAPPING KNOWLEDGE DOMAIN BASED ON MVC ARCHITECTURE

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ABSTRACT

With the development of information, simply disease and the result of literature retrieve have failed to meet the demands of medical researchers. Researchers want to obtain the general characteristics and research focus in a certain medical field from a vast amount of documents, and forecast its future trends. Therefore, under the PubMed database, a mapping knowledge domain based on MVC architecture is designed, where users can input interested content, and acquire the new trends and development in the field.

Keywords: Mapping Knowledge Domain, MVC Architecture, WEB Technology.

INTRODUCTION

As the medical research deepens and science and technology develop, simply disease retrieve, document retrieve, document measurement and knowledge query have failed to meet the demand of researchers. Scientific and technical personnel want to handle and analyze relevant knowledge of document in a higher level from a vast amount of documents in the database, so as to obtain a certain medical research focus, institutions relationships, co-citation information, author relationships and the future development trends in the field. Mapping knowledge domain refers to find knowledge gold from the mass of literatures, translates literatures into the needed information, and contributes to the development of science and technology, the disease treatment, knowledge innovation and scientific development. At present, more popular information visualization and analysis software are: Katy brner from Indiana University and his team developed a new piece of knowledge mapping analysis software Sci2 Tool, In-SPIRE, SciM AT, Hiscite, Pajek, Citespace, UCINET, Bibexcel, Gephi, VOSvi Ewer, VantagePoint, Network WorkbenchTool [1] and other information visualization and analysis software used by domestic scholars are: Citespace, Hiscite and Pajek mapping knowledge domain [2]. This system is very powerful and has various different algorithms, with many

visual setting parameters, but it has to be converted into Format before use, whose complexity, algorithms, and various plugin are not easy for beginners to acquire.

Web applications is a typical product of browser/server architecture, also the most widely-used application development technology on the Internet at present, which provides a consistent user interface, has a strong open, real-time information publishing, has better information system integration, dynamic user interaction and flexible secure connection with the back-office systems. Based on this, we designed a simple mapping knowledge domain based on MVC architecture and Web [3].

Technology Introduction

Mapping Knowledge Domain, also known as the knowledge domain visualization or a knowledge map. It use a graphical way to display the knowledge development process and structure relationship, use visualization techniques to describe knowledge resources and its carrier, drawing, exploring, analysis and display of scientific and technological knowledge and the linkages between them, creating a knowledge-sharing environment within their organization to promote the in-depth cooperation in science and technology. It can display

complex knowledge through data mining, information processing, knowledge measurement and graphing, and reveal the dynamic development law of knowledge, so as to provide practical and valuable reference for scientific research.

PubMed is developed by National Center for Biotechnology Information of United States National Medical Library, based on WWW query system. Provide biomedical paper searches and abstracts. Its database comes from MEDLINE. MEDLINE is a huge database with 100 million note. Its core topics are medical science, as well as other medical-related fields, such as nursing or other health sciences search engine. There are tens of thousands of medical researchers who obtain needed documents from PubMed.

System Design

Mapping knowledge domain we designed is a kind of data retrieval system based on the PubMed database, the main purpose of retrieving is to search the required analysis results through filtering the detail set by the system and filtering some specific vocabulary.

This system designs a typical BS system based on MVC (Model and the View, and Controller) pattern, including Browser and Server. Model represents the core of the application (such as a database record list). JDBC and MyBatis are used in this program to handle the data logic of the application. Model objects usually are used to access data in the database. View to display data (database records). Jsp, Js, HTML5, Echart and other page layout techniques are used in this application to display the data from the database. Controller is to handle user interactions in the application. Generally controllers are used to read data from a view, control user to input and send data to the model. Severlet, Dao and Work flow Module Service are used in this application so that the page sends request, process the request in the background and send the results to the page for display. According to the preliminary requirements analysis, the system has designed four modules, including data graphical module, retrieve detail module, subject module, and document detail module. As shown in Figure 1.

(1) Data graphical module: at Web search interface, click on knowledge mapping, which includes x axis and y axis, x axis for years, y axis for the number of documents issued. Year can be set through parameters keywords entered by the user and the system recommends 20 keywords as default, c also click "more keywords" to learn more. From Figure 2, you can search "Diabetic Nephropathy "relevant research, the amount of research literatures in each year from 1946 to 2014, the figure shows that there are totally 296 relevant literatures until 1987. In 20 years 'time, the research "Diabetic Nephropathy "has showed an increasing trend.

Retrieve Detail Module

As a common clinician, the most concern is what drugs are currently used for "Diabetic Nephropathy "treatment, then the settings function in the mapping knowledge can be used. Doctors know which drugs can treat the disease, therefore, therapeutic use in "under key words filter" can be checked, and the recent research direction or the therapeutic occurrences can be checked.

Keyword Module

More key words can be divided into multiple categories according to the different research direction, for example, Diabetic Nephropathy, DH, the more key words of this key word has "Amino, Peptides, and Proteins ", and this keyword evolution can be studied.

Documents detail module

Users search key words and call PubMed database, to find out all entries with the keywords in the local database, including title, author, year of issue, PMID number, keywords, SCI impact factor, etc.

Key Technology

Redis Memory caching Technology

Mapping knowledge mainly use key words, year, and other details. As analysis algorithms is complex and there are a large number in the analysis of data, so Redis memory cache technology is adopted.

Fetch the Pmid number sent out by keywords through Session, fetch the corresponding keyword, year, title, abstract and other detail information in the local database through Pimd unique primary key and pack them into Bean. As there are more than one key words in an article, the keywords have to be stored shard in the List, each shard keyword includes first level keyword and varying amounts of secondary keywords. In order to correspond to each keyword name and other information, we have designed five encapsulation methods for better management. First, packaging the keyword List and the year; second, packaging stored key words names, number of keywords appearance; third, placing year and keyword name combinations and Pmid collection (`HashMap<<Integer>>/Integer>>/>>HS;`) fourth, placing the secondary keyword names and secondary name with a keyword (`HashMap<String, IFSub>hs2</String, IFSub>;`), fifth, stored secondary keywords by the number from most to least. These five methods are encapsulated in IFmain for the whole call.

Mybatis contributes to the data persistence

MyBatis supports common SQL queries, stored procedures, and advanced mapping as a persistent excellent framework. MyBatis eliminates almost all manual settings for JDBC code and parameters as well as the retrieve of result sets. MyBatis uses simple XML or annotation for configuration and the original mapping, maps the interface and the POJOs of Java (Plain Old Java

Objects, ordinary Java objects) into database records.

In this project, the DBUtil class and DAO class are adopted to achieve data persistence. In the DBUtil

class, personally write the calls and closing of the link pool, configure the DB. properties file, and set parameters connected with database in the file.

Fig 1. System Function Modules

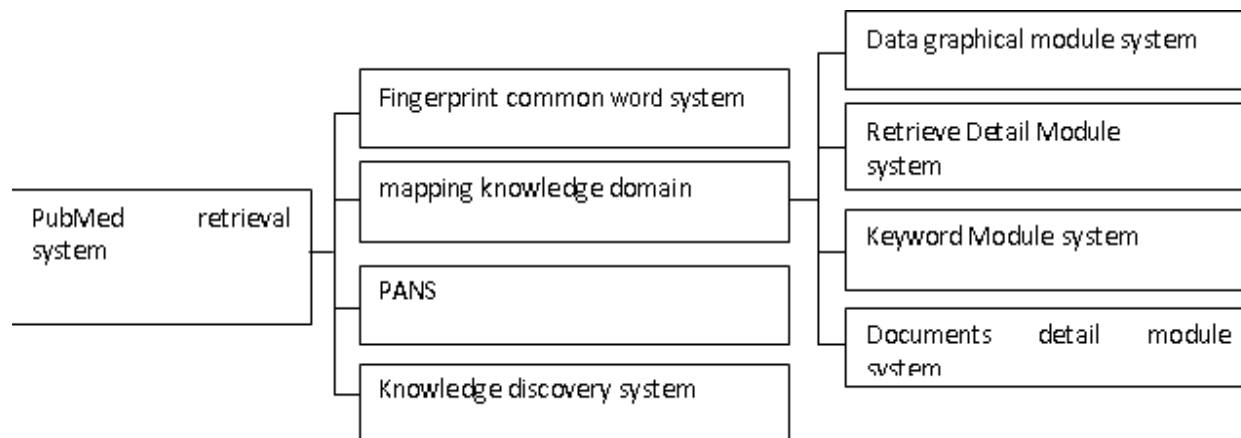
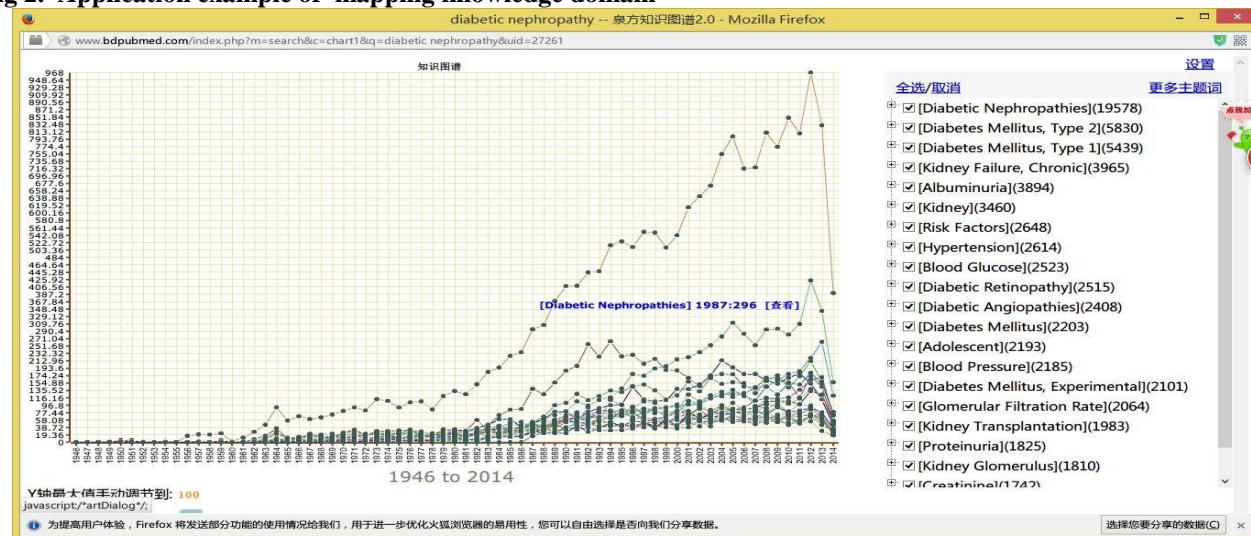


Fig 2. Application example of mapping knowledge domain



CONCLUSIONS

Data analysis is indispensable in the application of scientific research, this project enables users to analyze retrieving word through the Web-technology, so as to give the best results, and show the most intuitive mapping by Echart technologies. Users can filter word, year, quantity, weights and other details, so as to produce the most desired result. The developed system is based on the PubMed database, the Web mapping knowledge analysis tool provide a good solution to retrieve single, and at the same time, it is very easy to operate, easy to use, which will be helpful in the future research.

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CONFLICT OF INTEREST

Authors declared no conflict of interest.

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