triple C cognition
communication
co-operation

Progress in the Researches on Domain Informatics

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Abstract   With the application of computer technology and network technology, domain informatics have generated. Almost every combination of a basic subject and informatics can generate a new field of domain informatics by cross-study. However, the development of each discipline is in a different situation and a special degree. In this paper, the authors introduce chemical informatics, bioinformatics, medical informatics, and linguistics: their definitions, researches, and development trends.

1. Introduction

With the development of various basic disciplines, and its rapid growth in the amount of information to information organization, management and treatment, such as job faces enormous challenges, the urgent need to improve the speed and deal with information management. The rapid development of computer technology and network technology, timely for the basic disciplines of management provides the necessary tools and technical means. And with computer technology in the chemical professional in the field of data analysis, mathematical modeling, information inquiries and deal with the work of interaction play an increasing role, attracting a lot of experts in various disciplines and the concerns of information scientists and research, and gradually formed not only an information Different from the traditional sense of the scope of study, but also on different subject areas of the traditional sense there is the very edge of the development prospects of cross-disciplinary - Domain informatics. Domain informatics is a broad concept, the paper highlights on the

chemical informatics, bioinformatics, medical informatics, linguistics and other fields to introduction.

2. Chemical informatics

2.1 Definition of Chemical informatics

Chemical Informatics as a discipline to say the name is very new, but we will soon be able to understand that it exists in around us already have a period of time. Different people often give a different definition of chemical informatics. Therefore, we have listed a few of the earliest definition:

"Application of information technology and information-processing method has become the drug discovery process in a very important part of Chemical Informatics is actually a mixture of sources of information. It can be converted to compound data structure, by the structural information into knowledge, which makes our lead compounds in drug identification and organization of the decision-making process has become more effective."

"Chemical Informatics - an old issue of the new term."

"Chemical Informatics is a broad sense of the term; it will include the design of chemical information, creation, organization, processing, retrieval, analysis, dissemination and use."

In the article, we would like to study the establishment of chemical information in the application of methods to solve the problem of the long-term development on the history, as dedicated to those who decades ago began to develop this cross-disciplinary scientists their gift.

From this perspective, we intend to give a broader meaning of the definition of chemical informatics:

Chemical informatics is an application of chemical methods to solve the problem of discipline[1].

2.2 Research fields of chemical informatics

Because of the rapid development of chemical informatics, expanding its research content, the content of their research are summarized:

Traditional methods or network-based of the organization, management, retrieval, and use of chemical information. encoding and Description the Molecular structure, construction of three-dimensional structure and so on. Analysis and treatment of chemical information: Experimental design, data processing, exculpation and resolution map, bimolecular information analysis and the multivariate analysis and data mining technology. The use of computer systems of the physical and chemical properties of molecules prediction. Chemical education and teaching of modern technology, and remote information resources.

2.3 Research trends of chemical informatics

Now, these chemical informatics in the infancy has gradually grown into big trees and maturing, and they continue to grow. In fact, many methods in the 1960s and early 1970s have become in various computer systems were widely used, and continue to improve. Some early research in this field teams are also actively pursuing the development of updated, and many new research groups with their new ideas and new systems in these areas are to join the research work[2].

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[1] (Germany) Johann Gasteiger, Thomas Engel. (2003). *Chemo informatics: A Textbook.* John Wiley & Sons, 12.
[2] Li Wei. (2004). *Introduction to Bioinformatics.* ZhengZhou:

3. Bioinformatics

3.1 Definition of Bioinformatics

Bioinformatics as emerging disciplines, its broad definition refers to any use of computer networks and databases and large-scale biological data collection, management and organization of the relevant research fields, and the more narrow definition refers to computer the means and methods of biological genetic information and data management and analysis. Accurately said, referring to the computational biology to computer systems and computer algorithms used in the model of biological phenomena. Bioinformatics to computer technology to study means and tools, using mathematics, statistical models, simulation of biological sciences approach to solve the problem, thereby becoming biology, statistics, mathematics, computer science or engineering, and other disciplines of The cross-cutting areas.

3.2 Research fields of Bioinformatics

the establishment and biological database search. Biological database storage of biological information on the raw data, It is the basic of existence and development.
DNA and protein sequence analysis. The existing sequence databases to identify and sequence the user the same or similar sequence, and this sequence can provide features and functions related to important information, the problem is that DNA and protein sequence similarity analysis.
Forecast gene structure. Forecast for a section of DNA sequence or a species of the genome sequence in which specific regional representative for the function of genes encoding proteins Bioinformatics is the study of another classic problem. Forecast protein

structure and function. So far despite the known protein sequence over millions, but the structure of the protein known number is still only known protein sequence of less than 2% of the total. Analysis genomic data. Comparative genomic and phylogenies genetic analysis. Functional genomics and proteomics data analysis Signal transduction, metabolism and gene regulation means the Construction and description[3].

3.3 Research trends of Bioinformatics

The human genome project marks the completion of the genome era into the climax and the post-genome age. Genome Bioinformatics different, post-genome bioinformatics to obtain information from the genome of biological knowledge to understand the basic principles of life, but also has its practical purpose in biomedical applications. Post-genome bioinformatics and functional genomics in a gene chips and other high throughput technology-based system of linked experiments, but will no doubt that bioinformatics in experimental design and forecast to play a more dominant role. A large number of biological species genome sequence completed and analysis and Bioinformatics Institute for the Study of new means and results are rapidly changing biomedical research methods. Last, Bioinformatics for the design of biological experiments to provide information and ideas, narrowing the object of study. As a result, we function of the gene will greatly speed up the process. At the same time, bioinformatics will be based on comparative genomics, functional genomics and other branches of research

[3] Zhao Guo-ping. (2004). *Bioinformatics.* Beijing: Science Press, 4.

results, large-scale use of highly complex mathematical and statistical models of smart, the whole system and the level of substantial biological phenomenon some new theories and doctrines. For these doctrines and theories will be to verify the biological experiments to a new height so that the biological research into systems biology of the new era. Therefore, we have every reason to believe that biological information in the 21st century will continue to be rapid development, including nanotechnology and the combination of biological medicine to have a profound revolutionary impact[4,5].

4. Medical informatics

4.1 Definition of Medical informatics

Broadly speaking, the entire information in the field of health care can be called medical information. According to the characteristics of information carriers, we divided medical informatics into two major categories, namely natural and artificial medical information. Such as metabolic information, genetic information, information on nerve stimulation, mainly biologists and medical disciplines' task. They are natural information about a person, biological information. Generally, medical informatics does not research information on the human body and its intimate knowledge of the natural process, but interest in the study of medical information on the range. Therefore, in the future described in the book, if not specifically stated, we are talking about medical information is of Artificial Medical Information. There are many definitions about Medical

informatics, here the definition of Medical informatics is: The medical informatics is a new cross-edge disciplines which handling of medical information on the main subjects, the movement of medical information and its application method as the main research contents, computer as the main research tool and expansion of the information function of health care workers (especially the intellectual function) as the main research objectives.

4.2 Research fields of Medical informatics

Generally speaking, the medical information of the main areas of research includes the following four aspects.

Firstly, study the concept property, nature, characterization and measurement of medical information; these are the theoretical basis of the study, including the sense of philosophy.

Secondly, the study of medical information systems concept, composition, functions, principles, methods and means. Study information production, extraction, detection, transformation, transmission, storage, treatment and identification.

Thirdly, examine the use of medical information to carry out the principles and methods of control. Under the guidance of control theory, develop a variety of information, intelligence of the diagnostic equipment.

Lastly, Study the best implementation of medical information systems principles and methods of organization. Under the guidance of system theory, use of systems engineering technical, Hardware engineering, software engineering and knowledge of the method, developed the most effective medical information systems.

The first and the second are the understanding of law of exercise about the

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[4] Hao Bo-lin, Zhang Shu-yu. (2000). Bioinformatics Manual. Shanghai: Shanghai Science and Technology Press, 10.
[5] Li Zong-rong etc. (1991). Introduction to Medical Informatics. Wuhan: Wuhan University Press, 6.

medical Information. The third and the fourth are on the medical information applications. Understanding is the basis, the application is the goal.

4.3 Research trends of Medical informatics

Based on the details of research, we have knowledge of medical information is divided into two parts: The first part is the medical information processing tools and methods, another part of the medical fields of computer applications. At the same time we believe that medical informatics has four branches: computer tools and technology, engineering equipment and technology, medical information systems, and medical services management systems. As shown in Figure 1.
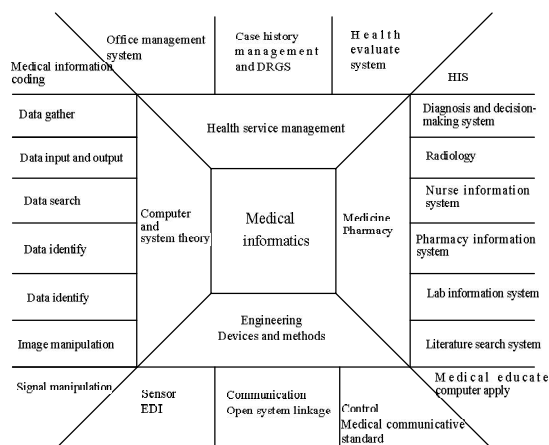

Figure 1: Block model of medical informatics system

5. Glaciology

In the 20th century 60s, the computer penetration to the field of linguistics, natural language processing (NLP) artificial intelligence to become one of the early research field. In the information society, language information processing technology has become the standard for measuring a country's modernization level of one of the important

symbols. Therefore, natural language understanding become one of language information processing technology into a high-level important direction of artificial intelligence community become the core concerns of one of the topics[6].

Today, in the "generalized information theory", many scholars borrowing "syntax, semantics, pragmatic" the three parts of the proposed definition of the three levels of information "grammar, semantics, pragmatic" the concept that their counterparts in Philosophy ontology, epistemology, the value of the three levels, and therefore have a grammar, semantics, pragmatics of information classification and "whole information" concept, does not seem so is not complete, one-sided information, further use of quantitative Language, mathematical formula to that of the entire information out. As a result, whole information theory becomes "scientific" and "philosophy of".

Put semantics as the value of theory about language, is a misunderstanding. Put syntax, semantics, pragmatics transplant express the information ontology, epistemology and the value of the three levels, is a misuse. The consequence is that the value of information science and theory, philosophy and confused information, the information on the nature of the study led astray. Use of "Occam Razor" rule, the effectiveness of the information and cut down the value of the remaining information carrier and the significance of information (meaning), the problem is more streamlined. In fact, in linguistics, semantics and pragmatics have been on the study are to discuss the significance of language learning, there is no

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[6] He Zi-ran. (1991). Pragmatics and English study. Shanghai: Shanghai Foreign Language Education Press, 1.

theory of value being represented as up, and now to rectify the "pragmatics" of misunderstanding, also its true colors.

References

[1] (Germany) Johann Gasteiger, Thomas Engel. (2003). *Chemo informatics: A Textbook.* John Wiley & Sons, 12.

[2] Li Wei. (2004). *Introduction to Bioinformatics.* ZhengZhou: Zhengzhou University Press, 10.

[3] Zhao Guo-ping. (2004). *Bioinformatics.* Beijing: Science Press, 4.

[4] Hao Bo-lin, Zhang Shu-yu. (2000). *Bioinformatics Manual.* Shanghai: Shanghai Science and Technology Press, 10.

[5] Li Zong-rong etc. (1991). *Introduction to Medical Informatics.* Wuhan: Wuhan University Press, 6.

[6] He Zi-ran. (1991). *Pragmatics and English study.* Shanghai: Shanghai Foreign Language Education Press, 1.

[7] Shi Chun-yi, Huang Chang-ning, Wang Jia-xin. (1995). *Principles of Artificial Intelligence.* Beijing: Tsinghua University Press, 2.

[8] (France) Jean-Marie Lehn. (1995). *Supramolecular Chemistry: Concepts and Perspectives.* peace-foundation.net.7host.com.

[9] Xu Lie-jiong. (1995). *Semantics.* Chinese Press, 10.

[10] Gao Ming-kai, Shi An-shi. (1987). *Introduction to Linguistics.* Beijing: Zhonghua Book Company, 3.

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