

Curriculum System Evaluation of Intelligent Data Engineering Based on Electronic Information Engineering

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Abstract. Intelligent data engineering is a multidisciplinary professional. It helps companies master the solution of various typical problems in large data applications from large data applications such as data management, system development, mass data analysis and mining. In this paper we analyze the curriculum system of electronic information engineering and intelligent data engineering based on the theory of complex network. Firstly, we construct the complex network models of electronic information engineering and intelligent data engineering. And then we replace the main course, and analyze the topology structure of them. The results show that the network model can accurately evaluate the influence of curriculum changes on the professional curriculum system.

Introduction

Intelligent data engineering is the result of cross-disciplinary development. This specialty focuses on understanding the cognitive process, focusing on improving machine learning and pattern recognition algorithms. The development of this professional is conducive to expanding the application of intelligent science and promote the development of intelligent science. Intelligent data engineering includes statistical sampling, estimation and hypothesis testing, artificial intelligence, pattern recognition, machine learning algorithms, modeling techniques and learning theory content. Focusing on data storage, indexing and query processing technology, high performance computing technology and distributed data processing technology. Electronic information engineering is the backbone of the field of information science. It is a subject of electronic information control and information processing, mainly to study the information acquisition and processing, electronic equipment and information systems design, development, application and integration. Electronic information engineering major training with electronic technology, information processing technology and radio and television technology senior technical personnel, which has the technical and information processing technology and radio and television technology, has a certain ability to innovate and strong practical ability to be in the radio and television industry and other industries engaged in electronic information and related areas of the design, development, application and integration. Based on the theory of complex network, we constructed the network of curriculum of electronic information engineering according to the interrelationship between classes, and builds the curriculum network of intelligent data engineering based on this. And then we analyzed the topology structure of the network model of intelligent data engineering and electronic information engineering. The results accurate evaluation of the main courses of intelligent data engineering professional, including "Development and application of large data", "Development and Application of Cloud Platform", "Cloud computing and virtualization technology" and "Large data security".

Construction of Curriculum Relationship Network

We take the courses in the professional curriculum system as the nodes of the network and the relationship between the courses as the links of the network. Then we can express the curriculum system

as a complex network model. We can understand the importance of each course in the course system by analyzing the topology of the network model[1, 2].

Construction of Courses Relationship Network Model of Electronic Information Engineering.

Electronic information engineering is specialized in computer technology, electronic information processing technology, communication technology and other modern electronic information technology integration. The main research content is information collection and processing, electronic and information system design, development, application and integration. The professional has a total of more than 70 courses, including circuit theory, information theory and coding, signal and system, digital signal processing, electromagnetic theory, automatic control principle. We chose 66 important courses as shown in Table 1 to build a curriculum relationship network.

We build a curriculum relationship network based on the interdisciplinary relationship of the curriculum. The network is a directed and weighted network. The nodes in the network are the courses in Table 1. The edge of the network is the relationship between the courses. The weight of a course is the size of a course that affects another course. For example, the Advanced Mathematics course is the basic course for signal and system courses. More than 50% of the signal and system course knowledge is related to higher mathematical knowledge. Thus, there is a slight difference between the higher mathematics and the two nodes of the signal and the system, with an edge weight of 0.5. Electronic information engineering courses network as shown in Figure 1. The network contains 66 nodes, 620 links, the average degree is 1.3338, the average out-closeness is 5.7023, the average in-closeness is 4.6657, global clustering coefficient is 0.793[3-6].

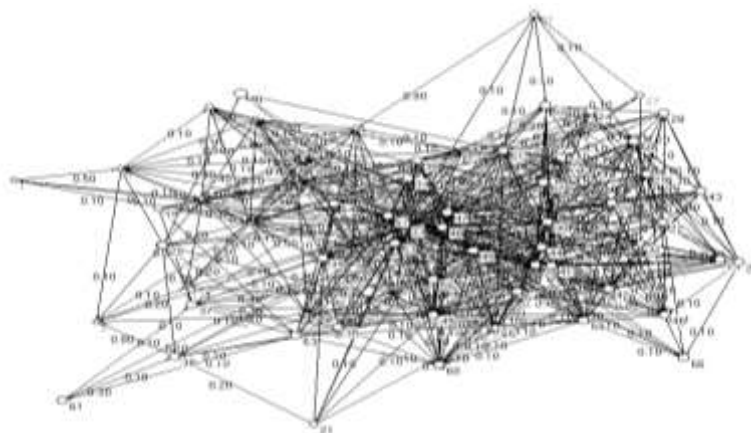


Figure 1. Courses Relationship Network Model of Electronic Information Engineering

Intelligent data engineering professional curriculum network. Intelligent data engineering increased "Development and application of large data", "Development and Application of Cloud Platform", "Cloud computing and virtualization technology" and "Large data security" curriculum based on electronic information engineering. The curriculum network as shown in Figure 2. The network contains 70 nodes, 662 links, the average degree is 2.6257, the average out-closeness is 5.6323, the average in-closeness is 4.7527, the global clustering coefficient is 0.8069.

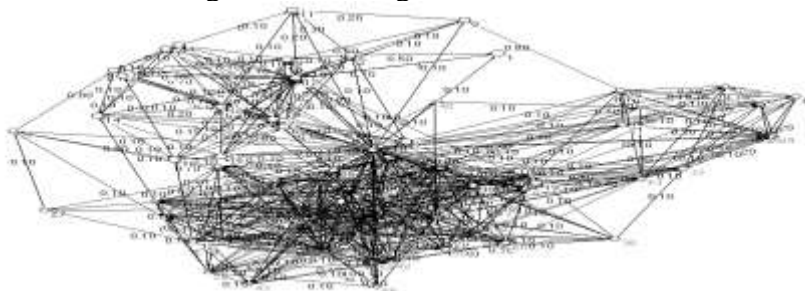


Figure 2. Courses Relationship Network Model of Intelligent Data Engineering

Table 1 Courses of electronic information engineering

No.	Course name	No.	Course name	No.	Course name
1	Basic manufacturing technology practice	23	Linear Algebra	45	Industrial field bus control technology
2	VC++ practice	24	Probability and Statistics	46	Knowledge extension of signal and system theory
3	Electronic technology practice	25	Complex Analysis and Integral Transformation	47	Electronic System Design
4	EDA practice	26	Physics of college	48	DSP Technology and Application
5	Production practice	27	Physics of college experiment	49	Image Processing Technique
6	MCU interface practice	28	Analog Electronic Technique	50	Electromagnetic Field Theory
7	ARM information system practice	29	Circuit Theory	51	Electronic Measurement
8	DSP practice	30	Digital Electronic Technique	52	Television technique
9	Image processing practice	31	Analog Electronic Technique experiment	53	DSP Engineering Case Analysis
10	Electronic system engineering practice	32	Digital Electronic Technique experiment	54	Technology of Information and Coding
11	Graduation practice	33	The Professional Introduction	55	Digital Speech Processing Technique
12	Graduation design	34	Micro-Computer Principle And Application	56	Pattern Identification and Application
13	Circuit CAD practice	35	The Special English	57	Multimedia technique
14	Electronic circuit practice	36	Sensors Technology	58	Digital communication system
15	Digital electronic practice	37	Java Program Designing	59	Optical Fiber Communication Techniques
16	Electronic CAD practice	38	VC++ Programing	60	The New technology of electronic information
17	DSP Comprehensive Practice	39	Single-chip Micro-computer And Interface Technology	61	Application Technology of Database
18	College Chinese	40	Mechanical Drawing and CAD	62	Microwave Technique
19	College Foreign Language	41	Signal and System	63	Computer Networks
20	University Computer Foundation	42	The Principle of Communication	64	Embedded Systems and Application
21	Computer programming (C language)	43	High frequency electronics Technology	65	EDA Technology and Application
22	Advanced Mathematics	44	Digital Signal Processing	66	Automatic Control Theory

Curriculum Evaluation of Degree Distribution Based on Degree Distribution

Degree is also called connectivity. It is one of the simplest and most important attributes of a network node [7, 8]. The degree of the node is the number of all edges connected to it. In the directional network, the degree of the node is divided into in-degree and out-degree. In the network with adjacency matrix $A(n \times n)$, if there is an edge from node i to node j , then $A_{ij} = 1$, then the out-degree k^{out} and in-degree k^{in} of nodes are respectively.

$$k_i^{out} = \sum_{j=1}^n A_{ij}, \quad k_j^{in} = \sum_{i=1}^n A_{ij} \quad (1)$$

The distribution of nodes in the network is one of the most important attributes. It can be described by the distribution function $P(k)$ and the cumulative distribution function $P_c(k)$. $P(k)$ represents the proportion of nodes with degrees k in all nodes, and $P_c(k)$ represents the proportion of nodes with degrees greater than or equal to k in all nodes. The degree and degree cumulative distribution of electronic information engineering as shown in Figure 3. The degree and degree cumulative distribution of intelligent hardware and product design as shown in Figure 4. We replace "DSP Engineering Case Analysis", "Digital communication system", "Single-chip Micro-computer and Interface Technology" and "Computer Networks" with intelligent "Development and application of large data", "Development and Application of Cloud Platform", "Cloud computing and virtualization technology" and "Large data security", respectively. The degree and degree cumulative distribution of intelligent hardware and product design as shown in Figure 5. As can be seen from the figure, the original curriculum on the curriculum system is very small.

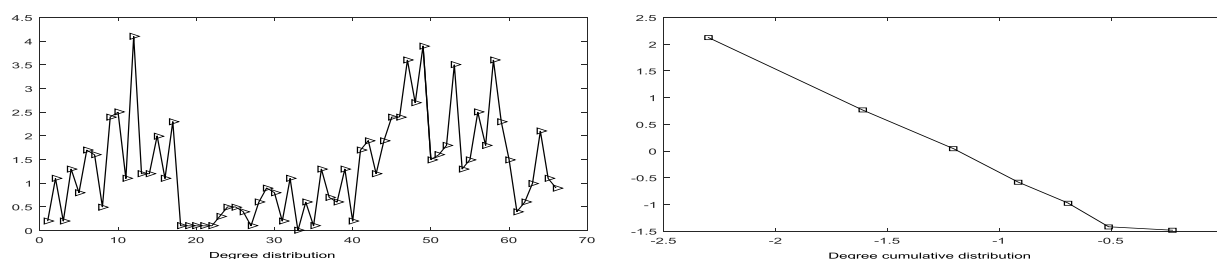


Figure 3. Degree and cumulative degree distribution of electronic information engineering

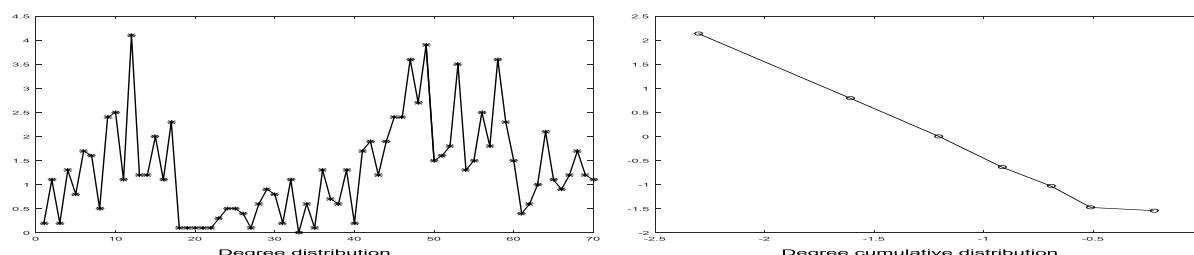


Figure 4. Degree and cumulative degree distribution of intelligent data engineering

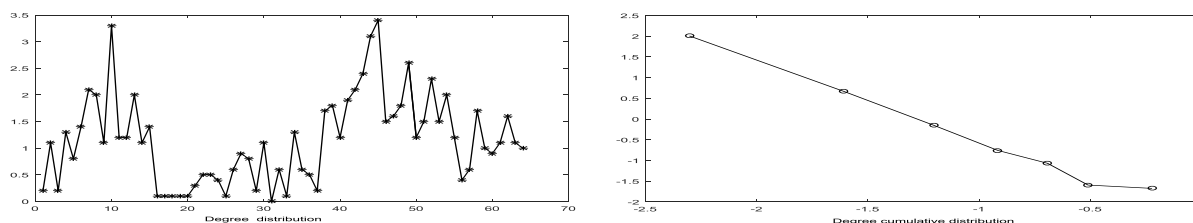


Figure 5. Degree and cumulative degree distribution of intelligent data engineering after the replacement of courses

Summary

Intelligent data engineering is the inevitable product of social development. In this paper we analyzes the curriculum system of electronic information engineering and intelligent data engineering based on the theory of complex network. Firstly, the network models of electronic information engineering and intelligent data engineering are constructed. And then we analyzed the topology of the network models of electronic information engineering and intelligent data engineering. The results show that the model can accurately evaluate the influence of curriculum changes on the professional curriculum system.

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