The Dynamic Trend and Hotspot in the Clothing Field in China in Recent Five Years——Based on the Visualization of CNKI Mapping Knowledge Domain

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Abstract. This paper took the recent literature in the field of clothology in China as the object to reveal new researching characteristics and to provide references for relevant industrial development. Based on the mapping knowledge domain, this paper adopts literature research method to analyze the sample literature by co-word analysis and so on. Studies show that, research in the field has drawn tremendous attention and exhibit a steady development. The related researches, meanwhile, are concentrated in three field of textile industry, industrial economy and fine arts. The hot spots could be summarized in three aspects: fashion design, apparel culture and fashion brand. Innovations: basically the relevant researches in this field used the foreign specialized software such as CiteSpace, which relatively more difficult. In this paper we provide a new research approach - a visual analysis embedded in CNKI. It combines the multiple functions of specialized software. Especially its" co-occurrence matrix analysis" and "keywords co-occurrence network" cluster analysis, make ordinary customers could grasp them.

1. Introduction

With the development of society, clothing has become the cultural symbol of modern people's temperament. Modern science have been continuously feeding new elements into clothing. Thus, new products, new materials and new processes are emerging prominently. As a theoretical support of the clothing industry, clothology has been drawing more and more attention, and the research results have been more and more abundant. It is necessary to systematically sort out the studies in this field, which will assist the theoretical study in clothing science and promote the development of the industry.

Clothology first appeared in China as an independent discipline in the 1980s. This is "a systematic knowledge based on the objective of clothing as the main line". The study of clothing and its related phenomena is a interdisciplinary comprehensive discipline combined with engineering, sociology, art, marketing and other disciplines [1]. The establishment of clothology has become a milestone in the field of clothing science in China. With the Opening-up policy, clothing science has achieved a qualitative lea. In the 1990s, China became the world's largest garment exporter. Clothology in China paced up with the international trend rapidly. Clothing science in China is blooming and developing dramatically.

Literature is the crystallization of knowledge and also an important embodiment of a discipline's development. This paper takes the literature in this field as the research object. Based on the searching result in China National Knowledge Infrastructure, we found there are very few articles on the overall

study of Chinese clothing science from the perspective of bibliometrics, using knowledge maps. There are mainly two articles: "A study on the literatures for Chinese clothing discipline based on bibliometrics" by Fangping Yin , et al. [2], "Analysis of the research of Chinese clothing discipline from 2005 to 2016", Yan Li , et al. [3]. They both analyze the literature from a very professional perspective to reveal the characteristics of researching domain. The analysis method used by Yin Fangping is a statistical tables. Li Yan used the Cite Space software. Several other related papers are concentrating on a certain aspect of clothology, for example, Huiwei Zhang's "Research on literature metrology of digital garment technology based on scientific knowledge map" [4].

To summarize, this paper selects the literature in China National Knowledge Infrastructure for the past five years, and uses CNKI's embedded automatic statistical analysis function, especially knowledge map, to make an comprehensive analysis of Chinese clothing science research, reflecting the new features in this field. At the same time, it provides a new way for future research in the field - CNKI's embedded hot-spot analysis function.

2. Data Sources and Research Methods
In this paper, the literature is processed by analyzing the time series and co-word analysis by using knowledge maps, in order to study the age distribution, subject distribution of the papers, high frequency word co-occurrence matrix and co-occurrence network structure and to find out research hot-spots in clothology. The tools used are mainly embedded data acquisition and analysis functions of the CNKI platform..

2.1. Data Source
The data source is CNKI "Chinese Academic Journals (online version)" (CAJD), which is a well-recognized full-text library of Chinese journals. The search strategy is:

> (Subject = "clothing" or "fashion" or "costume")
> Not (Title = "collection" or "essay" or "notice" or "speech")
> And (Time = 2014.1.1 – 2018.12.31)
> And core journals

The search time is October 26, 2019. In order to ensure that the sample data is comprehensive and accurate, the search field is selected as subject, and the exclusion function of the CNKI search platform is used to directly block the invalid information such as "collection". In order to ensure the data source is academic, the core journal literature is selected. This led to the retrieval of 4,227 valid articles, which was used as the research object.

2.2. Knowledge Map
The broad knowledge map includes: gene map, cognitive map, etc., which is a visual display of knowledge. The narrow knowledge map mainly includes scientific maps, bibliometrics graphs, etc. [5]. The core function of this narrow knowledge map being discussed here, is to display abstract information in image, revealing the network structure and the complex relationship between interaction and intersection among knowledge units or knowledge groups, and intuitively reflecting subjects from various levels', fields' information on the profile of development, knowledge structure, etc., which has been applied to many disciplines.

2.3. Co-word Analysis
The basic principle of the co-word analysis is to use keywords as the analysis object, and use a large number of co-occurrence keywords pairs in the literature to reflect the relationship between the topics. The more the word pairs appear in the same document, the more relevant the two themes are represented. Co-word analysis, is the statistics of co-occurrence of word pairs, which displays the statistics in the knowledge map.

2.4. Research Tools
By searching CNKI we found that CiteSpace and other software are used in this study field. The data needs to be imported specifically for those software, which some need the assistance of third-party

software such as Ucinet. It is difficult and hard to learn. This paper provides a new approach - the visualization of bibliometrics embedded in CNKI. CNKI platform has powerful functions: multi-grouping, statistics visualization and analysis, and multiple functions of those specialized software, which is easy to operate. The research tool in this paper is the three visualization analyzing parts embedded in CNKI - time, subject and keyword, mainly about the cluster analysis.

3. Research Results and Analysis

3.1. The Age Distribution of theLiterature
Knowing the quantity of annual literature, we can macroscopically grasp the development trend of research in the field. In 2014-2018, the research literature in the field of clothing in China was 885, 852, 802, 942, and 746, as shown in figure 1.
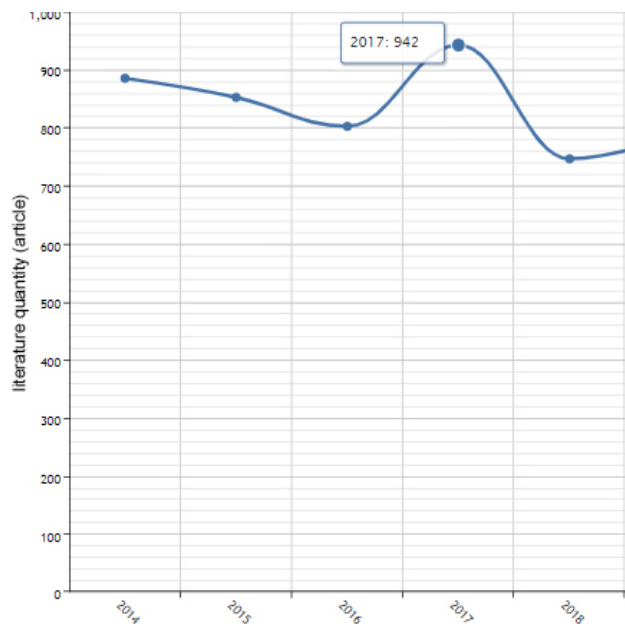

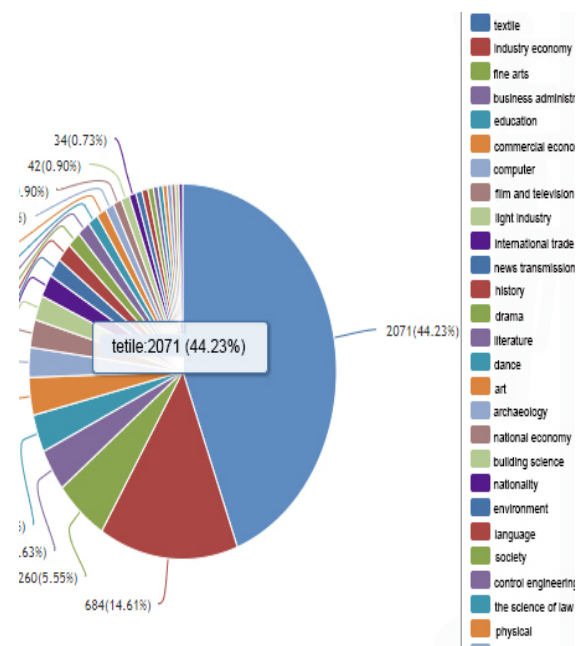**Figure 1.** Distribution of literature quantity in the clothing field in recent five years.

Figure 2. Discipline distribution of literature volume Top30.

It can be seen from Fig.1 that in the past five years, Chinese clothology research can be summarized into three stages: the first stage is 2014-2016, the second stage is 2017, the third stage is 2018, the first and third stages show a downward trend, the research heat reduction. In the second phase of 2017, the amount of literature increased significantly, the research was becoming more active. From the perspective of general trend, it is a wave-like development trend. The total amount of literature in each year is higher than 700, indicating that has been receiving attention. It is in a relatively stable development stage.

3.2. Disciplinary Source Distribution of the Literature
The distribution of disciplines reflects the cross-infiltration relationship between research in this field and other disciplines. The disciplines of Top30 in this field in the past five years is shown in Fig.2.

It can be seen from Fig.2 that the literature in this field is mainly concentrated in the fields of textile, industrial economy and fine arts. The most literature-rich part is textiles which accounts for 44.66%. From the perspective of disciplinary attribution, GB/T 13745-2009 " Discipline Classification and Code List of the People's Republic of China", the subject related to clothing, is the "clothing technology" under the category of textile science and technology, explained the amount of textile literature is the largest. Secondly, the reason for high literature amount in industrial economy may be

the huge consumption power in clothing of China. The research in clothology is closely related to the development of industrial economy. The third largest part is fine art. Modern people are more concerned about aesthetic taste so the demands are becoming pluralistic. Therefore, it produces a large number of interdisciplinary literature that intersect with clothing and fine art.

3.3. High Frequency Keyword Co-occurrence

The keyword is the word that can expresses the core content, so the keyword is selected as the research object. The keyword visualization of CNKI searching results shows the highest frequency keywords and their corresponding literature in 4,227 documents according to the frequency. The Top30 high frequency words are shown in Fig.3.
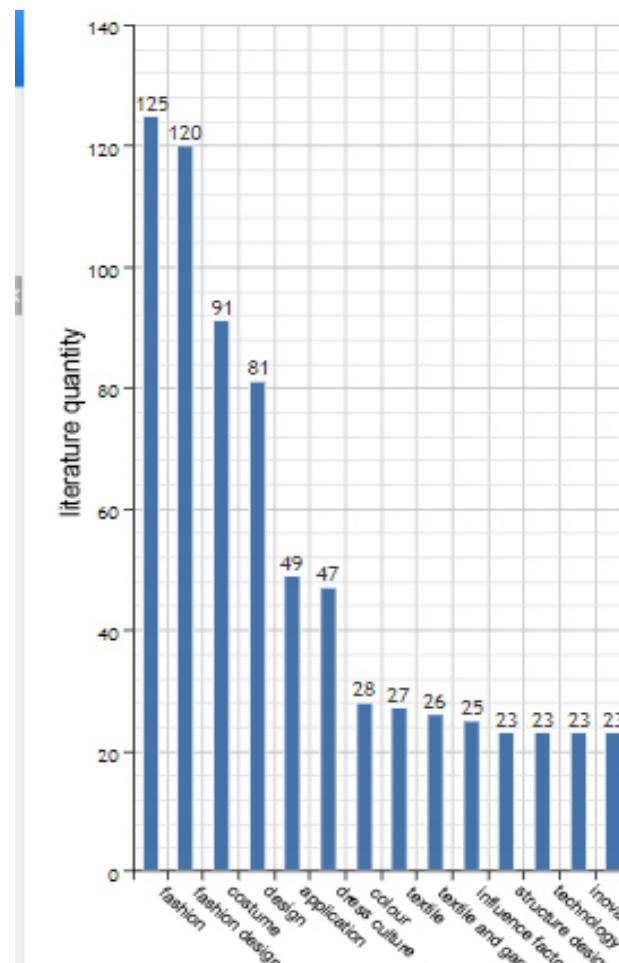

Figure 3. Top30 high frequency keyword

It can be seen from Fig.3 that the keywords with the highest frequency are clothing, fashion design, costumes, etc. These are the main objects in the field of clothing research. However, the statistical comparison of single high-frequency word cannot reflect the essential relationship between the subjects, nor can it effectively reveal the hot-spots of research field. The following will further explore them by using keyword co-occurrence matrix and cluster analysis.

The system randomly selected the top 20 high-frequency keywords (frequency ≥ 20), and performed pairwise statistics to obtain a 20×20 keyword co-occurrence matrix (see figure 4), which shows the most related 20 word pairs, indicating that there is a high degree of cross-infiltration between the themes represented by these high-frequency words.
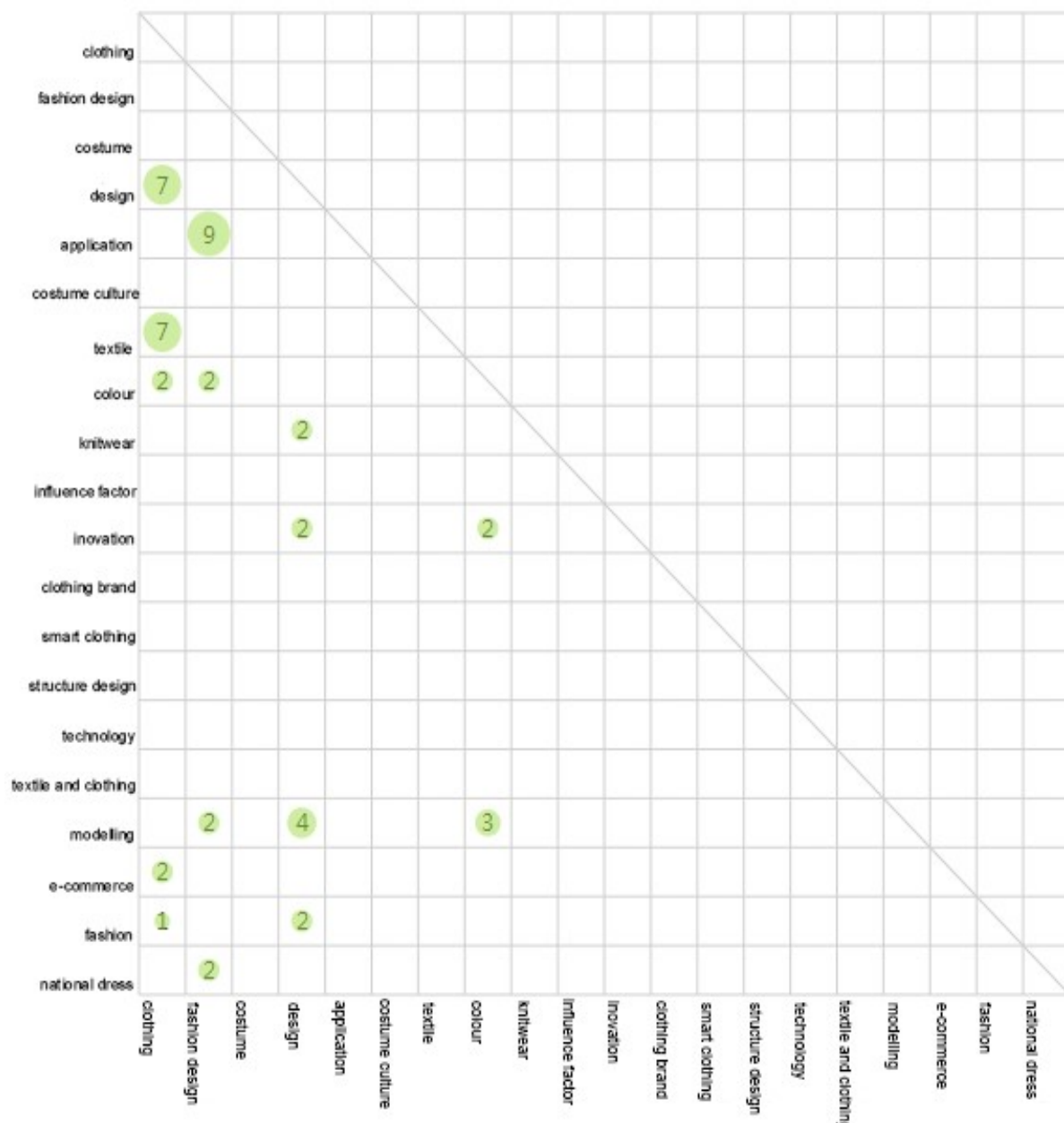
Figure 4. Top20 high frequency keywords co-occurrence matrix.

3.4. High Frequency Word Co-occurrence Clustering
The knowledge map (figure 5) of the high-frequency word co-occurrence matrix (figure 4) is obtained by CNKI embedded visual analysis of searching results.
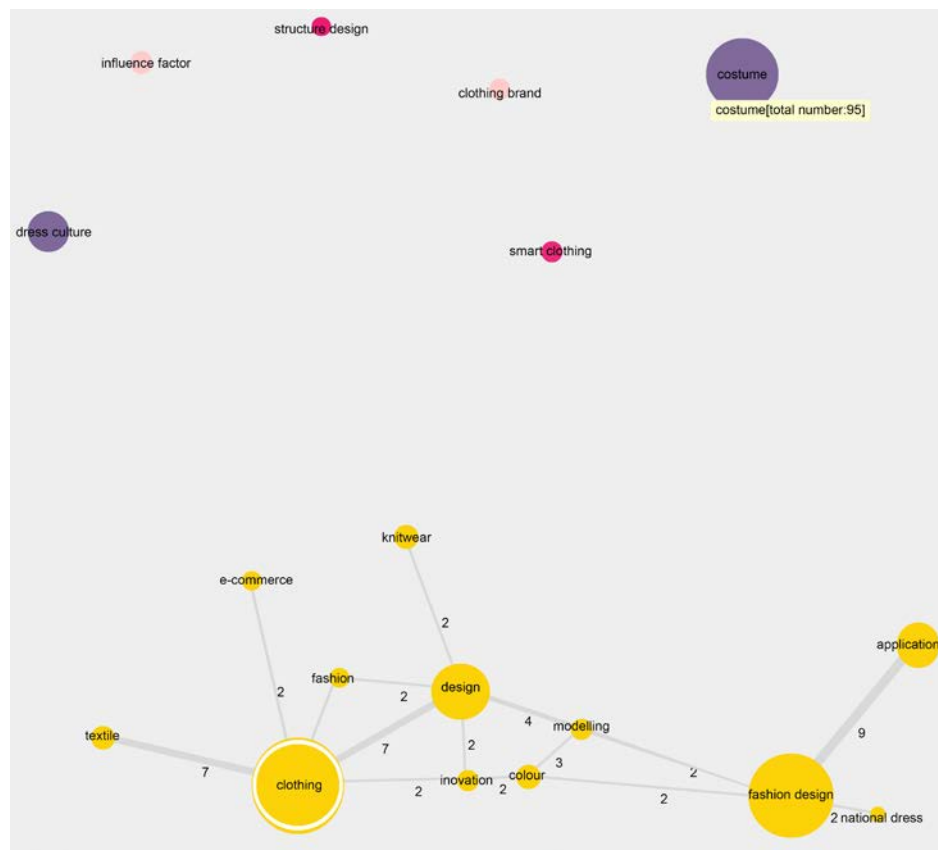
Figure 5. Top20 high frequency keyword co-occurrence map

The keywords in Fig.5 are represented by circular nodes, the size of the nodes increasing with the document amounts. The connection between nodes indicates that there is a co-occurrence relationship between the keywords. The thicker the connection, the closer the two keywords are connected. Different colors represent different word families, the largest word family - "fashion-design" family has 12 keywords, followed by "apparel-culture" family, "fashion-brand" family, "structural design" family. Each of the colors represents a subfamily of multiple collections of documents and multiple keywords. Each family includes a number of keywords and their corresponding documents, as shown in Fig.6.

According to the analysis above, the research hot-spots in the field of clothing in the past five years can be summarized into three domain: fashion design, apparel culture, fashion brand, combining the relevance of the keywords and the subject attributes.

4. Analysis of Research Gotspots in the Field of Clothing

4.1. Fashion Design
This hot spot stems from clustering: "fashion-design" (Fig.5), high-frequency words such as clothing, fashion design, applications, etc. "fashion" and "fashion design" are the two nodes that have the largest amount of literature in entire clustering network. (Fig.5), "fashion design" can be described as a key-spot in hot-spots. China is transforming from clothing manufacturing into clothing creating. The core of creation is innovation. Design is the first step to fulfill innovation. Therefore, it has become the biggest research hot-spot in the field of clothing. As can be seen from Fig.4, in this hot-spot, "application" and "fashion design" have the highest frequency of co-occurrence. The application of various design elements and techniques in fashion design is particularly concerned. In Sunan Xue's "Research of bionic elements and its artistic expression in clothing design"[6] , it pointed out that new bionic technology should be applied to fashion design in time, expounding various bionic elements in

shape, color, pattern texture and functional design. In Hongjuan Chen's " Design of pleat knit fabric and its application in knitwear "[7], it describes three process designs of woven knit pleats: four flat strips, positive and negative plain compound, partial braiding. They analyze the texture performance of knitted pleats and its application in knitted garments. It is believed that the pleats formed by this method are stable and natural, which are different from those formed by external forces of woven techniques, which are in line with the characteristics of knitted fabrics. In Fengqiu Guo's "Study on the creative application of the element of Chu phoenix in modern clothing pattern design" [8], they analyze the characteristics of the phoenix bird of Chu Silk fabric, highlighting four methods of applying phoenix elements to contemporary clothing design using modern media and technology: transfer, deconstruction, reconstruction, misplacement. These are the traditional techniques inherited from Chu Culture and further promoting it, enriching the semantics of fashion design. In Yuting Yang's "Creative application of decorative art in modern costume design" [9], they analyze the application characteristics of decorative art in fashion design. The creative method of decorative art has been explained in the paper and the dynamic integration of decorative arts in fashion design is also proved to be an important developing direction in their report.
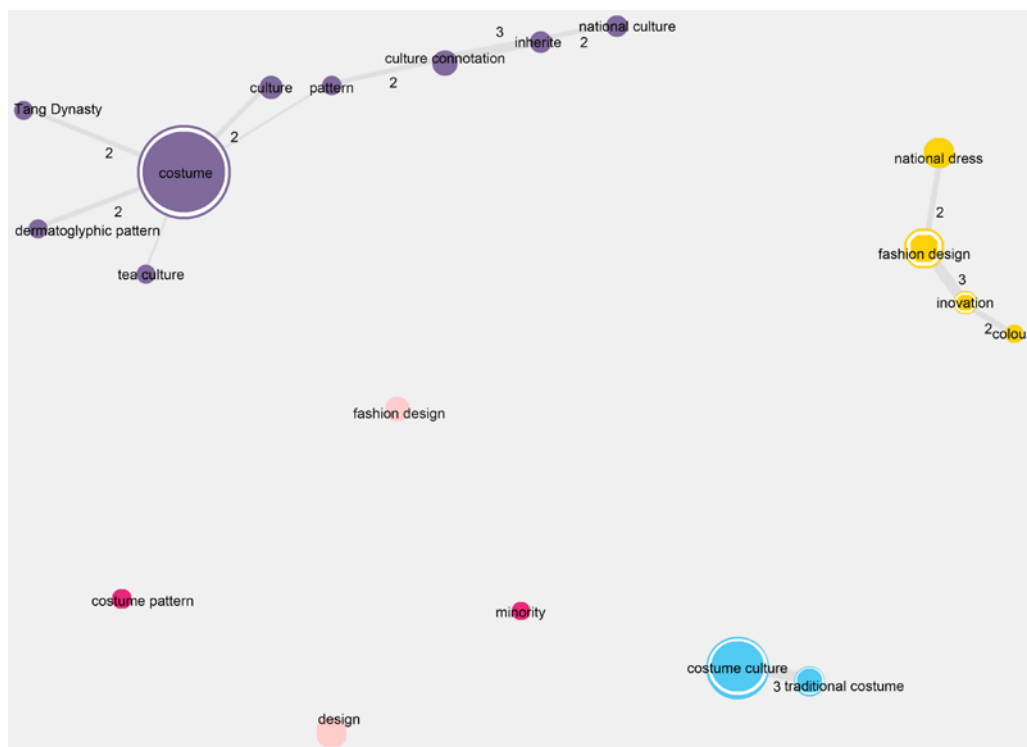

Figure 6. Top20 high frequency keywords co-occurrence map in "dress-culture" family

4.2. Apparel Culture

"Apparel", that is, clothing and its decorations. The hot-spot is derived from the cluster "apparel" and "apparel culture". The main keywords include: apparel, apparel culture, national costumes, etc., reflecting the joint connection between Chinese clothing and culture, national elements. In Ping Yan's "The inheritance and development of the Chinese costume culture" [10] ,it is believed that clothing is an integral part of human culture, reflecting historical and cultural connotations of social politics, economy, folklore, etc., which is a materialized form of aesthetic consciousness as well. In Xiaoyu Wang's, "Discrimination of ho-momorphic patterns on Han's traditional costumes" [11] , it is believed that costume pattern is the most representative image record of regional culture. Homomorphic pattern originates from artistic representation and is essentially the embodiment of cultural connotation. The paper analyzes the elements, artistic representation and cultural connotation of homomorphic pattern, and reveals the subjective and objective reasons for its existence. In Liao Jiangbo, Xiaoming Yang's,

"Investigations on commoner clothing culture based on comparative perspective of hemp and silk" [12] , it is believed that apparel fabrics carry a certain social and cultural connotation. Based on the contrast between cloth and enamel, through the literature and cultural relics, the role of cloth apparel culture in the shape of clothing is examined, revealing the dual cultural connotation of cloth as the wearing apparel and the civilized sprite. In Qiang Xu and other's "Interpretation of Taiwan Paiwan tribe clothing patterns cultural connotation" [13], it analyzes the theme and characteristics of the Paiwan costumes, and summarizes its cultural connotations from six aspects: grade markers, ancestor admiration, reproduction worship, national customs, faith sustenance, myths and legends.

4.3. FashionBrand
The hot-spot stems from clustering "fashion brand" and "influencing factors", related words such as brand, design, e-commerce, etc. In the era of brand economy, brand, such as British BURBERRY, French CHANEL, becomes their ID in the international market. It provides an important guarantee for their stable position in the world economy. In Ying Cheng's "Study on the international strategy of the brand of the textile and garment enterprises"[14] , it puts forward the entry mode for international brand market, emphasizing three types of international marketing strategies of textile and apparel industry brands. In Ling Zhou's "Research on the impact of e-commerce development on brand clothing competitiveness" [15], it analyzes the e-commerce model and its impact on brand apparel competitiveness, and puts forward six principles of branding under the e-commerce model. In Jing Zheng's "Research on the impact of e-commerce development on brand clothing competitiveness" [16] , it emphasizes that the brand style gene should be fully understood as it is a long-term accumulative wealth and should be widely integrated with new styles like series design. It also analyzes three series of clothing design patterns based on brand style genes. In Ling Yu's "Influencing factors and weight distribution of brand garments showcase display image"[17], it divides the influencing factors into two-level index factors and builds the evaluation index system. It turns out that, clothing culture factors, personnel professionalism and attitude are relatively important, and the internal environment construction of the showcase is particularly important. The background design factor of the showcase is the most influential.

5. Conclusion
Based on the principle of bibliometrics, this paper adopts the literature research method, and takes the literature of clothology in CNKI core journals in the past five years as the research object. Cluster analysis of research hot-spots in this field, the conclusions are as follows:

5.1. From the perspective of the distribution of literature volume, the research in the field of clothing science in China has been in a wavy, overall stable and developing state which drew a lot of attention.

5.2. .From the perspective of the distribution of literature subjects, the research in the field of clothing science in China is mainly concentrated in the fields of textile, industrial economy and fine arts, which are determined by the subject property, commodity and sociality of clothing.

5.3. Through the co-occurrence cluster analysis of high-frequency words, the research hot-spots in the field of clothing science in China in the past five years can be summarized into three: clothing design, apparel culture, and clothing brand.
    In the era of innovative economy, society calls for innovation. As a major import and export country of clothing, China needs the innovation in clothing. Clothing design is the first step in clothing innovation; apparel culture innovation is the first priority of clothing innovation; high-end clothing branding is the necessary way for Chinese clothing to become international.

6. Acknowledgments

7. References

[1]   Xiaogang Liu 2016 *Conspectus of Clothing Science: Revised Edition* (Shanghai: Donghua University   Press) **p 103**

[2]   Fangping Yin, Jingwei Liu and Dawei Zhang 2007 A study on the literatures for Chinese clothing discipline based on bibliometrics *Journal of Xi'an University of Engineering Science and Technology* **(01):66-74**

[3]   Yan Li and Jie Li 2017 Analysis of the research of chinese clothing discipline from 2005 to 2016 *Journal of Beijing Institute of Clothing Technology:Natural Science Edition* **37(3):33-45.**

[4]   Huiwei Zhang 2017 Research on literature metrology of digital garment technology based on scientific knowledge map (Hangzhou: Zhejiang Sci-Tech University)

[5]   Siluo Yang and Ruizhen Han 2013 Studies in the status quo of knowledge mapping application research abroad *In-formation and Documentation Services* **(6):15-20.**

[6]   Sunan Xue 2017 Research of bionic elements and its artistic expression in clothing design *Wool Textile Journal* **45(11):51-53**

[7]   Hongjuan Chen 2017 Design of pleat knit fabric and its application in knitwear *Shanghai textile science & technology* **45(12):33-36+56**

[8]   Fengqiu Guo 2017 Study on the creative application of the element of chu phoenix in modern clothing pattern de-sign *Art & Design* **(12):140-141**

[9]   Yuting Yang 2015 Creative application of decorative art in modern costume design *Hundred Schools in Arts* **31(S1):140-142**

[10]   Ping Yan and Fu Cheng 2014 The inheritance and development of the chinese costume culture *Jiangxi Social Sciences* **34(9):244-248**.

[11]   Xiaoyu Wang and Weidong Gao 2017 Discrimination of ho-momorphic patterns on Han' s traditional costumes *Journal of textile research* **38(01) 116-120**

[12]   Jiangbo Liao and Xiaoming Yang 2016 Nvestigations on commoner clothing culture based on comparative per-spective of hemp and silk *Journal of silk* **53(04) 72-77**

[13]   Qiang Xu, Dongsheng Chen and Yingjin Gan 2016 Interpre-tation of Taiwan Paiwan tribe clothing patterns cultural connotation *Journal of textile research* 37(12) 111-116

[14]   Ying Cheng 2015 Study on the international strategy of the brand of the textile and garment enterprises *Shanghai textile science & technology* **43(9)1-2**

[15]   Ling Zhou 2017 Research on the impact of ecommerce development on brand clothing competitiveness *Wool textile journal* **45(9) 97-99**

[16]   Jing Zheng 2017 Clothing series design method based on brand style gene: taking Dior as an example *Art & design* (**11**) **128-129**

[17]   Ling Yu , Wenjin Hong and Miao Yu 2018 Influencing factors and weight distribution of brand garments showcase display image *Journal of textile research* **39(06) 162-166**