



# Visual Analysis of Research Hotspots and Trends on Design Research Related to Yi Ethnic Cultures Based on Citespace

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**Abstract.** This paper discusses the research status, hot spots, frontier and development trends of design topics related to Yi ethnic cultures through visual analysis of the related research literature. With CNKI database as its original data, the paper sums up digital library research papers from 1985 to 2002 analyzes time and space distribution, institution, writer and key theme distribution through literature metrology with “Yi nationality” and “design” as the search subject words by CiteSpace 5.8 R3 software. The study found that there is a total of 852 literatures, Liu Jiaping, Tan Liangbin, Guo Jing, Hu Yue and Li Zhouzheng are the top 5 authors published most, Kunming University of Technology, Yunnan Normal University, Yunnan Academy of Arts, Chongqing University and Sichuan Normal University are the top 5 institutions which published most. The survey also found evidence that Yi costumes, Yi culture and Liangshan Yi are the top 3 central research hotspots, besides innovative design and cultural creative products are the research frontier of design topics related to Yi ethnic cultures. Knowledge map analysis can intuitively and quickly shows the development trend, research hotspots and leading edge of design topics related to Yi ethnic cultures research, and provides reference data and development direction for further research.

**Keywords:** The Yi Nationality · Design · Citespace · Knowledge Graph · Visual Analysis

## 1 Introduction

The Yi nationality is the sixth largest ethnic minority in China. It is mainly distributed in Yunnan, Sichuan, Guizhou and the northwest of Guangxi Zhuang Autonomous Region, concentrated in Chuxiong, Honghe, Liangshan, Bijie, Liupanshui and Anshun. The unique plateau climate and steep geographical environment gave birth to a variety of Yi culture [9]. Under the impact of modern civilization and rapidly developing social economy, the embroidery, clothing, silver making skills and traditional architectural construction skills in Yi areas have been listed in the national intangible cultural heritage list, and have gradually become an important driving force for the sustained and rapid economic growth of Yi areas. With the impact of rural revitalization, National

Poverty Alleviation Policies and tourism industrialization [12, 23], Yi culture has gradually become the focus of research, protection and inheritance by the state, universities, enterprises and relevant social figures. Yi design is a product based on Yi culture. It is a technical creation and creative activity carried out by designers with goals and plans. In order to meet the diversified, personalized and trendy characteristics of market consumers, Yi culture has been continuously applied to modern clothing design, teaching design, packaging design, environmental design, product design and other fields, driving the development of social and economic diversity.

CiteSpace is an information visualization software developed by Information Science Professor Chen Chaomei. Under the Java environment, it can convert a large number of literature data into a visual knowledge map, and clearly reflect the development context, research hotspots, development trend and trend of Yi design research field [5, 11]. This study uses the latest version of CiteSpace software to visually analyze the literature related to Yi design, and intuitively reflects the research hotspot and development trend in the form of scientific metrology method and co-occurrence network knowledge map, which is intended to have sufficient objective theoretical basis for analyzing Yi design literature.

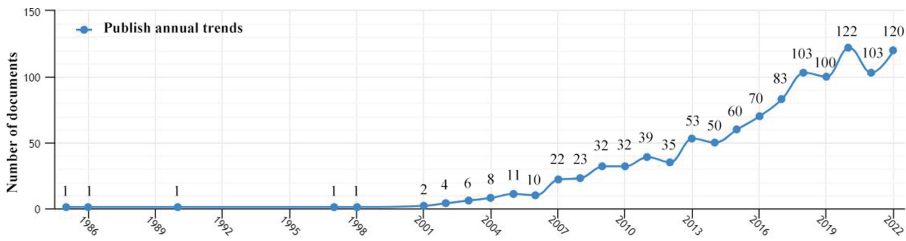
## 2 Data and Methods

### 2.1 Data Source and Data Processing

The data of this study comes from the full-text database of Chinese academic journals (i.e. CNKI). Chinese literature retrieval is carried out with “Yi nationality” and “design” as the subject word. The retrieval period is unlimited, including 981 documents in academic journals, dissertations, conferences, newspapers and so on. After eliminating duplicate documents, news publicity, conference reports, newspapers, government or association project releases and works exhibitions, a total of 852 valid documents were obtained. Export the target documents included in the study from CNKI in the format of reworks to the input folder established in advance, and rename the exported file format as download-01.txt that can be run by CiteSpace software.

Using CiteSpace 5.8 R3 software for processing, set time slicing from 1985 to 2022, years per slice as 1 year, selection criteria top 50, practicing select Pathfinder and practicing sliced networks, and node types as author, institution and keyword respectively, and finally obtain statistical data and knowledge graph.

In the co-occurrence knowledge map, all authors, institutions and keywords in the literature are represented by nodes. Node size indicates frequency. The connection of nodes represents the co-occurrence relationship, and the thickness of the connection indicates the co-occurrence intensity. The color from purple to yellow indicates the change of time from early to recent. The centrality reflects the importance of nodes in the network structure. The network density reflects the tightness of the co-occurrence network structure [5].



**Fig. 1.** Changes in the number of design documents issued by Yi nationality from 1985 to 2022.

## 3 Results and Analysis

### 3.1 Basic Characteristics of Literature

#### 3.1.1 Annual Distribution of Literature

The annual number of documents published can dynamically reflect the research trend of literature related to Yi design. Figure 1 shows the change of the number of documents published on CNKI with the theme of “Yi nationality” and “design” over the years. It can be seen from the figure that the overall number of documents issued from 1985 to 2022 showed an upward trend. The first article retrieved was Zheng Shifu’s initial results in the reform of the design office of Chuxiong Yi Autonomous Prefecture in Yunnan Province published in May 1985 [24], which mainly aimed at the reform of construction enterprises and encouraged designers to innovate through design scheme competition.

According to the statistics of the number of documents, there were only 11 articles published from 1985 to 2002. Due to the occlusion of the geographical environment of ethnic minorities, the concept of cultural output is relatively weak, and the researchers have little exploration and understanding of Yi culture. Most of them intuitively focus on the architectural environment, which is a preliminary study of Yi design research. After 2002, the number of articles published showed a rapid growth trend with small fluctuation, and the predicted value of the number of articles published in 2022 was 120. Affected by Rural Revitalization, intangible cultural heritage protection and inheritance, and National Poverty Alleviation Policies, people paid more attention to Yi culture, and the research content gradually expanded from architectural environment to national costumes, folk handicrafts In the design fields such as language, this is one of the important factors for the increasing number of documents related to Yi design year by year. Since 2002, the number of documents issued has shown a rapid growth trend with small fluctuation, and the predicted value of the number of documents issued in 2022 is 120. Affected by rural revitalization [8], intangible cultural heritage protection and inheritance [25], and national poverty alleviation policies [15], people have paid more attention to Yi culture, and the research content has gradually expanded from the architectural environment [3] to the design fields of national costumes [16], folk handicrafts [14], languages and characters [19]. This is one of the important factors for the increasing number of documents related to Yi design year by year.

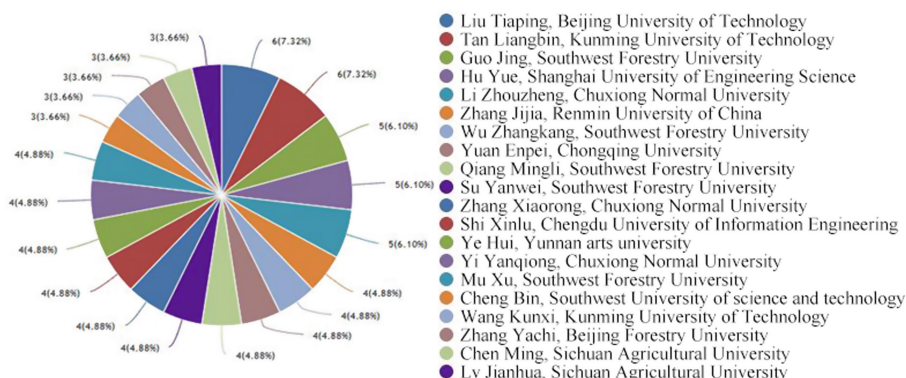


Fig. 2. Top 20 authors and their institutions of Yi design research from 1985 to 2022.

### 3.1.2 Author and Institutional Analysis

Through the scientific metrological method analysis of authors and institutions by CNKI, Fig. 2 shows the top 20 authors and their institutions. The more documents, the greater the contribution rate of individuals to Yi design research. It can be seen that Liu Jiaping and Tan Liangbin have the largest number of 6 documents, accounting for 7.32%. Secondly, the number of literatures by Guo Jing, Hu Yue and Li Zhouzheng is 5, accounting for 6.10%. There were 10 people with 4 articles, accounting for 4.88%. Among the top 20 authors, 5 belong to Southwest Forestry University, indicating that the university has a high contribution rate of individual documents.

The number of papers issued by research institutions reflects the research space and power distribution in the academic field. Figure 3 shows the top 20 research institutions in the number of documents issued. From the ranking of the issuing institutions, it can be seen that Kunming University of technology has the largest number of documents, up to 143, accounting for 26.05%. Yunnan Normal University took the second place, with 57 articles, accounting for 10.38%. The number of papers issued by Yunnan Academy of Arts was 46, accounting for 8.38%. The first three universities are located in Kunming, Yunnan Province, close to Shilin Yi Autonomous County. Chongqing University and Sichuan Normal University have maintained a good strategic cooperative relationship with Liangshan Yi Autonomous Prefecture and Mabian Yi Autonomous County, which has played a positive role in promoting the number of documents issued by the institution. According to the literature review, most of the documents published by the top ranked institutions are dissertations, indicating that the institutions attach great importance to Yi design.

The geographical distribution of Yi nationality directly affects the number of documents issued by institutions. The superior geographical environment provides convenient and reliable help for the academic research of institutions. Through the co-occurrence network analysis of authors and institutions, it is found that the authors with close cooperation belong to the same institution, and there is less cooperation between institutions.

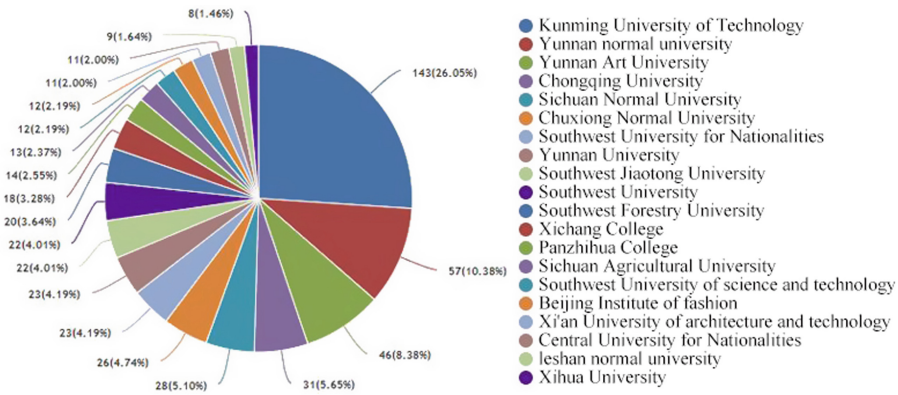


Fig. 3. Top 20 institutions of Yi design research from 1985 to 2022.

### 3.2 Keywords Analysis

#### 3.2.1 Keywords Co-occurrence Network

The key words can be condensed and effectively reflected in specific research fields [4]. Using CiteSpace software, this paper conducts a full-text search on the topics of “Yi nationality” and “design” from 1985 to 2022, and generates a keyword co-occurrence diagram with 481 nodes, 707 connections and network density of 0.0061, as shown in Fig. 4. The first 30 keywords are shown in Table 1. In the keyword co-occurrence network, the higher the frequency of keywords, the larger the node display; The higher the centrality, the more important the node is in the network. Nodes with centrality greater than 0.1 are key nodes.

It can be seen from Fig. 4 and Table 1 that the research content of Yi nationality design is relatively extensive, mainly involving national costumes, lacquerware, patterns, cultural connotation, protection and inheritance, art design and other fields. In addition to the keywords repeated with the search words, the words with high frequency and strong centrality are: Yi clothing, Yi culture, pattern, Liangshan Yi, innovative design, inheritance, traditional folk houses, Yunnan Yi, etc., which are the hot research fields in recent years. Among them, the centrality of Yi clothing, Yi culture and Liangshan Yi is greater than 0.1, which has higher intermediary centrality. The research year is early, and the importance of keywords continues to this day. Liangshan Yi Autonomous Prefecture, located in the southwest of Sichuan, is the largest Yi inhabited area in China. In the process of targeted poverty alleviation, Liangshan Prefecture People’s government has promoted the development of Yi costumes and national cultural products by means of revitalization of traditional crafts, establishment of intangible cultural heritage workshops and development of cultural industries [17].

#### 3.2.2 Keywords Cluster Analysis

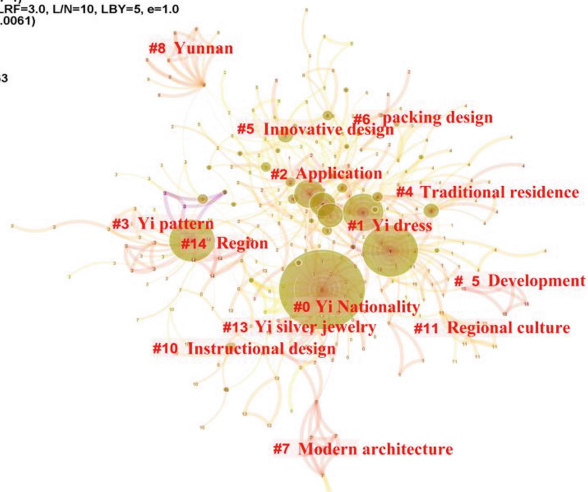
On the basis of keyword clustering, as shown in Fig. 5. The clustering module value in the map is 0.7397 ( $Q > 0.3$ ), indicating that the network structure is very significant, and the average contour value of clustering is 0.9163 ( $S > 0.7$ ), indicating that the internal



**Table 1.** (continued)

Serial number	Keyword	Centrality	Frequency	Serial number	Keyword	Centrality	Frequency
10	Pattern innovation	0.01	23	25	Product design	0.01	9
11	Realistic meaning	0.00	23	26	Regional culture	0.03	9
12	Impart and inherit	0.06	23	27	Yi lacquerware	0.01	9
13	Pattern application	0.00	21	28	Dress pattern	0.01	8
14	Innovative design	0.07	21	29	Clothing design	0.01	8
15	Innovate	0.05	17	30	Embroidery	0.04	8

CiteSpace, v. 5.8.R3 (64-bit)  
 February 14, 2022 8:21:52 PM CST  
 WoS: D:\work\W1\Nationality\output  
 Timespan: 1985-2022 (Slice Length=1)  
 Selection Criteria: g-index (k=25), LRF=3.0, L/N=10, LBY=5, e=1.0  
 Network: N=481, E=707 (Density=0.0061)  
 Largest CC: 304 (63%)  
 Nodes Labeled: 1.0%  
 Pruning: Pathfinder  
 Modularity Q=0.7397  
 Weighted Mean Silhouette S=0.9163  
 Harmonic Mean(Q, S)=0.8186



**Fig. 5.** Keywords clustering of Yi design research literature from 1985 to 2022.

research topics of clustering are clear and centralized, with high reliability, and there is high similarity among clusters. According to the clustering results, there are 14 effective clusters in Yi design research, which are Yi Nationality, Yi clothing, application, Yi pattern, traditional folk house, innovative design, packaging design, modern architecture, Yunnan, teaching design, regional culture, Yi silver jewelry, region and development. It is generally believed that the clustering effect is better when the number of cluster documents is greater than 10, and the clustering effect is worse when the number of cluster documents is less than 10. Table 2 is the statistics of keyword clustering data with

**Table 2.** Keywords clustering data statistics.

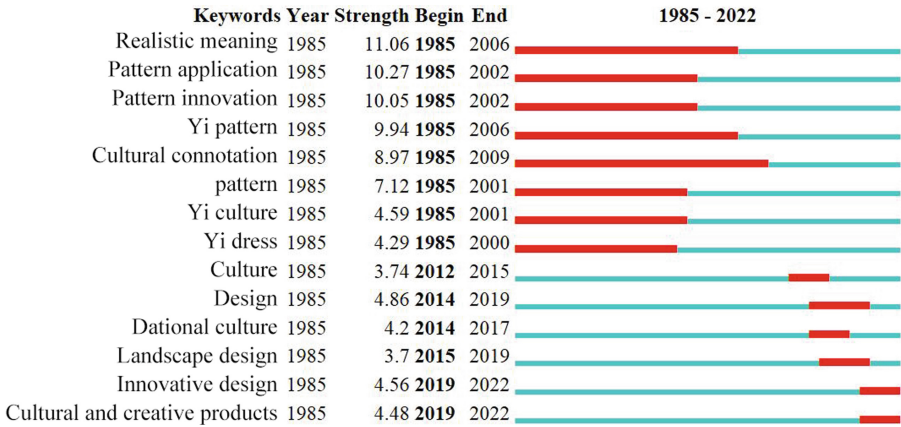
Cluster number	label	Number of documents	Identifier
0	Yi Nationality	47	Yi Nationality; Regional characteristics; Yi dress; Pattern; Realistic meaning
1	Yi dress	46	Yi dress; Pattern; Realistic meaning; Cultural connotation; Yi culture
2	Application	32	Application; Innovate; Tourism products; Clothing elements; Cultural and creative products
3	Yi pattern	31	Yi pattern; Pattern innovation; Pattern application; Architecture and furniture; Yi culture
4	Traditional residence	30	Traditional residence; Chu Xiong; Traditional settlement; Inherit; Yuanyang
5	Innovative design	27	Innovative design; Yi furniture; Nationality; Brand design; Character modeling
6	Packing design	22	packing design; Yunnan Yi Nationality; Embroidery; Application research; Culture industry
7	Modern architecture	21	Modern architecture; Yunnan Province; Regionality; A seal; Spirit of place
8	Yunnan	13	Yunnan; National folk crafts; Museum; Cultural function; Creative analysis

the number of cluster documents greater than 10. Marker words are the high-frequency key words in the cluster, which reflect the key research fields and research directions of the cluster, and can provide enlightenment and reference for Yi design researchers.

### 3.3 Keywords Emergent Analysis

The keyword emergence chart can clearly reflect the research frontier and evolution trend within the research years, and strength reflects the heat of research. As can be





**Fig. 6.** Top 14 keywords with the strongest citation bursts about Yi nationality from 1985 to 2022.

seen from Fig. 6, 14 words appeared from 1985 to 2022. The practical significance is the research frontier from 1985 to 2006, and the emergence degree is 11.06, indicating that researchers attach great importance to the practical significance of Yi culture during this period. This keyword has a deep impact on the research and development of Yi design. Pattern application and pattern innovation are the research frontier from 1985 to 2002, and the emergence degrees are very high, 10.27 and 10.05 respectively, It shows that Yi design pays more attention to the understanding and innovative application of Yi patterns in the early stage of research.

It is not difficult to find that cultural connotation is the key word that lasts for the longest period of 24 years, followed by the sudden popularity of patterns, Yi culture and Yi costumes. These research contents have laid a solid theoretical and material foundation for Yi design. In 2014, the keyword design [2, 4, 10] began to appear, and in 2015, the keyword landscape design [18, 21] began to appear. With the upsurge of design, researchers began to conduct more profound research and Consideration on the decoration culture, architectural culture and furniture culture of the Yi people, in order to adapt to the pace of the changeable modern society, Innovative design [1, 6, 20] has become the mainstream of design so that Yi culture can be recognized by the broad masses of the people and effectively promote local social and economic development. Under the background of huge tourism industry development, cultural and creative products [7, 13, 22] have gradually become a material presentation for the export of cultural and intellectual property rights of all ethnic groups and can obtain better benefits.

## 4 Conclusion

Using scientific metrology method and CiteSpace knowledge atlas software, this paper makes a visual analysis on the literature related to Yi design in CNKI database from 1985 to 2022, and analyzes the research hotspots and development trends in this field from five aspects: annual document volume, author and organization, keyword co-occurrence, keyword clustering and keyword emergence. The results show that:

- (1) The annual number of documents issued is increasing year by year, and the research field shows a trend from shallow to deep, from single to comprehensive, from reference to innovation.
- (2) Liu Jiaping, Tan Liangbin, Guo Jing, Hu Yue and Li Zhouzheng are the main authors. Kunming University of technology, Yunnan Normal University, Yunnan Academy of Arts, Chongqing University and Sichuan Normal University are the main research institutions.
- (3) Yi costumes, Yi culture and Liangshan Yi are the most central research hotspots; Yi Nationality, Yi clothing, application, Yi patterns, traditional houses, innovative design, packaging design, modern architecture and Yunnan are important key words; Innovative design and cultural and creative products are the research frontier of Yi design.
- (4) At present, there are many institutions studying Yi design in China, but the cooperative relationship between the institutions is not obvious, and the cooperative relationship among the internal members of the institutions is relatively close.

In view of the current research progress, the following three suggestions are put forward for the future design research of Yi Nationality:

- (1) The existing research contents of Yi design mainly focus on clothing, patterns, embroidery, silver jewelry, lacquerware, architecture, furniture and teaching; The main research areas are Yunnan, Liangshan and Chuxiong; Brand design, packaging design, cultural and creative product design and interactive interface design are the latest fields of innovative design research. On the basis of previous experience, researchers can learn from each other's strengths to offset their weaknesses, and push the Yi design research to a deeper and broader level.
- (2) With the development of information and communication technology and the change of knowledge society environment, the innovative design with user centered and user participation as the core is gradually formed. Researchers need to combine innovative ideas with design practice, give full play to creative thinking, integrate science, technology, culture, art, society and economy into design, and develop more scientific, novel, creative and practical academic research results for Yi design and other fields.
- (3) In the context of targeted poverty alleviation, Rural Revitalization and tourism and cultural industry, research institutions can give full play to their geographical environment advantages and scientific research experience, strengthen strategic cooperation and cultural exchanges with Yi areas, and promote mutual benefit and win-win results of academic achievements and local economy. Various research institutions can hold academic talks on the fields related to Yi design, so as to provide students with clearer and rich research hotspots and development frontiers.

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