

# Visualization Analysis of Literature on Ancient Qin Tablature Based on China National Knowledge Infrastructure (CNKI).

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**Abstract.** The guqin is the oldest plucked musical instrument in Chinese history, and its commonly used notation system, jianzipu, was created by Cao Rou during the Tang Dynasty. Since the existence of the guqin, finger techniques have gradually become more complex as the skills of playing this instrument developed. The learning process has evolved from oral transmission between master and disciple to written notation and eventually to jianzipu over hundreds of years. Jianzipu represents a significant leap forward in notational precision and scientific accuracy for recording guqin music compared to previous methods. It embodies a level of rigor and scientific approach that modern notation systems cannot achieve. To conduct a comprehensive analysis of research on jianzipu, I first performed a macro-level analysis of 194 articles on this topic published from 1951 to August 2022. Additionally, in order to ensure relevance, accuracy, and scholarly value in article retrieval, I focused on analyzing highly cited papers published between 1980 and August 2022 regarding their publication journals, authors' names, citation counts, themes/topics covered, and publishing institutions involved. This study utilized visualization analysis techniques to examine existing research achievements from multiple perspectives while exploring challenging issues within this field as well as future development trends. Furthermore, this study provided new ideas and methodologies for interdisciplinary approaches towards humanities and social sciences research advancements with an aim to contribute towards their future development.

**Keywords:** Jianzi notation Guqin visualization interdisciplinary

## 1. Introduction

The guqin is the oldest plucked instrument in Chinese history, and its commonly used notation system, known as Jianzi Pu, was created by Cao Rou during the Tang Dynasty. The reason why ancient guqin scores have been passed down for thousands of years is due to the significant role played by Jianzi Pu. It accurately and scientifically records guqin music in a way that modern notation systems cannot achieve.

Since the ancient times of the guqin, due to the gradual complexity of finger techniques accompanying the development of guqin skills, learning to play this instrument has undergone

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a process spanning hundreds of years. It started with oral transmission between master and disciple, then progressed to written notation and finally evolved into Jianzi Pu.

Since the Han Dynasty, there have been recorded names for playing techniques on the qin. Although written notation could document the performance style of qin music, it was deemed inconvenient for recording and learning due to its excessive length. Therefore, when tonal systems emerged, qin players believed that improvements were necessary. They attempted to represent finger techniques with simpler symbols while also simplifying written notation. Despite symbolization being unable to fully replace text, after centuries of evolution, written notation gradually developed into jianzi pu (abbreviated notation). Over several decades, jianzi pu for guqin underwent continuous reforms such as the three-line staff in Wuhan and the standard staff in Yunnan. In the 1960s, Shanghai Conservatory of Music introduced an improved five-line jianzi pu system, and in 1993 someone proposed computer coding and pitch translation flowcharts for jianzi pu [1].

Based on the 194 results related to jianzi pu published between 1951 and August 2022, it can be observed that there is limited research on guqin jianzi pu in contemporary society. However, due to the influence of its own development and other factors, the symbols and systems of finger techniques within jianzi pu are diverse, with a wide range of forms and names. Therefore, further research on jianzi pu is crucial for better understanding its intricacies.

## 2. Literature sources and study methods

This article draws data from the China National Knowledge Infrastructure (CNKI) and focuses on the topic of "jianzi pu." In order to provide a comprehensive analysis of jianzi pu, the author initially conducted a macro-level analysis of 194 results obtained from CNKI between 1951 and August 2022. These results consisted of 165 academic journals and 20 dissertations. Employing visual analysis, this article systematically examines existing research achievements from multiple perspectives and explores challenging issues encountered in the research as well as future development trends.

## 3. Macroscopic results and the analysis

### 3.1 Literature index analysis and general trends

Data source: 194 articles were selected							
index analysis							
Number of references	Total reference number	Total arguments	Total downloads	Number of references in each article	The total number of citations	Number of downloads per article	Download the citation ratio
194	723	685	58512	3.73	3.53	301.61	0.01

Figure 1 Literature index data chart

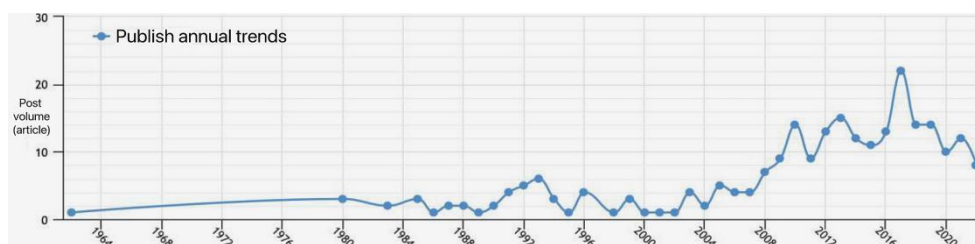


Figure 2 Overall trend analysis

From Figure **Error! Reference source not found.**, it can be observed that out of the 194 literature sources, the total number of downloads reached 58,512, with a total reference count of 723. However, the total citation count was only 685, and the download-to-citation ratio was as low as 0.01. This indicates that there is considerable public interest in "jianzi pu," but there are relatively few individuals engaged in in-depth exploration. As a result, some published articles may not provide sufficient theoretical and literary support for research on "jianzi pu," leading to a situation where demand exceeds supply.

After the publication of the first article on "jianzi pu" in 1962, research in this field remained stagnant for twenty consecutive years. From 1980 to 2008, the number of publications fluctuated with a relatively low average annual publication rate (Figure **Error! Reference source not found.**). However, from 2008 to 2017, there was an upward trend in publications with fluctuations (Figure **Error! Reference source not found.**), indicating a gradual increase in researchers focusing on this area. The peak year was observed in 2017 when there were 22 published articles (Figure **Error! Reference source not found.**), suggesting significant attention given to the study of "jianzi pu" during that period. From 2017 to 2022, there has been a decreasing trend in publications (Figure **Error! Reference source not found.**), indicating a decline in research interest and potential stagnation or bottleneck encountered by current research efforts. Nevertheless, further exploration and investigation are still possible for future studies

### 3.2 High-frequency keyword analysis

According to CNKI data, terms like "qin xue" (the study of the qin), "qi xian" (seven strings), "Chinese guqin," and "guqin qu" (guqin music) are relatively high-frequency keywords. Among them, "qin xue" appeared 24 times, followed by "qi xian" with 17 occurrences, while both "Chinese guqin" and "guqin qu" appeared 15 times. This indicates that research on jianzi pu in our country is generally focused on these directions. The term "qinxue," which embodies the profound cultural connotations of the oriental tradition carried by the guqin, is particularly valuable for exploration. On the other hand, keywords concentrated around "guqinqu," as compared to other ancient musical instruments' compositions, guqinqu possess a unique charm in terms of artistic conception and tonality. The sound of the guqing itself is mellow and gentle with a soft volume. Guqingqu has an ancient simplicity and broad harmony with profound content that evokes distant sentiments. It represents a poet's deep contemplation through repeated low singing; it captures the essence of heroic spirits and worldly interests. For thousands of years, guqingqu has portrayed China's rich historical ambiance through its tranquil beauty—thus making scholars not only focus on techniques and notation but also attach great importance to studying various aspects related to ancient melodies.

The high-frequency keywords mentioned above indicate the inseparable connection between jianzi pu research and the guqin, a traditional Chinese musical instrument. While studying jianzi pu, it is also essential to conduct research on the Chinese guqin.

### 3.3 Summary of research institutions, authors, and subject distribution analysis

In Figure **Error! Reference source not found.**, the author's collaboration analysis reveals that most of the collaborating authors are research scholars from universities, particularly those affiliated with comprehensive universities. However, collaborations are mostly limited to researchers from the same institution and occur infrequently. Scholars from independent music colleges have a lower publication output, indicating less research focus on jianzi pu within these institutions. This suggests that scholars in the field of professional music have relatively low attention towards jianzi pu. At the same time, it reflects a trend in current humanities and social sciences research where scholars from various fields are beginning to cross over into other disciplines for interdisciplinary studies and horizontal expansion of research areas. Through my investigation into jianzi pu literature, it is evident that some engineering-oriented research methods have started to be applied in humanities and social sciences studies. For example, genetic algorithms for generating sections of guqin jianzi pu represent a multidisciplinary approach combining biology with computer science and computer science with music—an expansion of perspectives that provides new ideas and methodologies for future humanities and social sciences research.

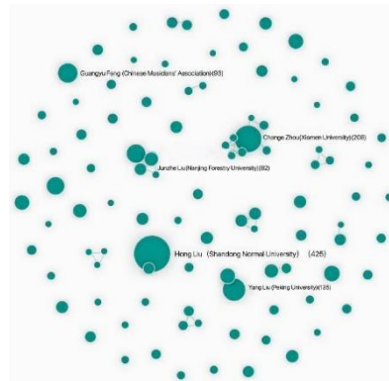


Figure 3 Cooperative network analysis of the authors

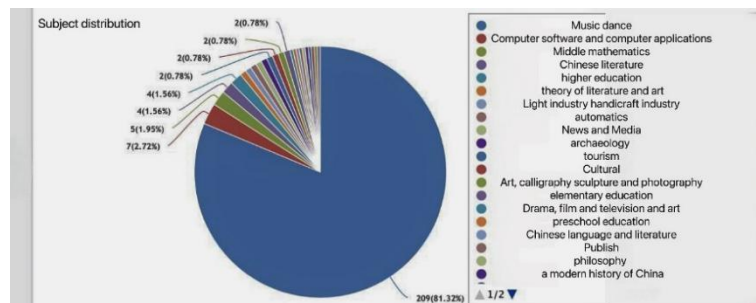


Figure 4 Subject distribution

According to Figure **Error! Reference source not found.**, research on "jianzi pu" covers multiple disciplines. However, it is interesting to note that the scholars with higher publication output are primarily engaged in fields unrelated to music. For example, Liu Yang from Peking University graduated with a bachelor's degree in Information Science from the School of Mathematical Sciences and pursued a combined master's and Ph.D. program in Finance at Peking University's Economics School. Currently, he serves as the Party Secretary of the International Hospital at Peking University. Tang Yingmin from Peking University is a senior engineer at Wang Xuan Institute of Computer Technology at Peking University. Zhou Changle from Xiamen University holds a professorship position in the Department of Intelligent Science and Technology at Xiamen University. Lv Lanlan, also from Xiamen University, specializes in Visual Communication and Media Design research. Ding Xiaojun is an English teacher at the Foreign Languages Department of Xiamen University. Other examples include Liu Hong, an associate professor from Shandong Normal University's College of Information Science and Engineering; Zhang Yingli working in the Modern Educational Technology Teaching Department at Ludong University; among others. These findings explain why scholars with higher publication outputs tend to be concentrated within comprehensive universities—they come from diverse backgrounds outside traditional music-related fields.

In their paper titled "Methods for Processing Jianzi Symbols under Windows," Zhou Changle and others from Xiamen University mentioned the lag in digitization work for guqin (ancient Chinese zither) and its impact on the instrument's development. They proposed a new method of jianzi pu encoding called Octal Semantic Encoding and applied this encoding method to in-depth research on the guqin [2]. Similarly, Zhang Yingli and colleagues from Ludong University presented a genetic algorithm-based approach for generating guqin music compositions in their paper titled "A Genetic Algorithm-Based Method for Generating Guqin Music." To address the significant workload involved in transcribing guqin music, they proposed using genetic algorithms to assist with composition generation. By converting various jianzi pu symbols into corresponding codes, they extracted information from guqin music in a digital format. This method provides inspiration and assistance to composers of guqin music [3]. These examples highlight the importance of interdisciplinary collaboration, which opens up new research methods and perspectives. They provide guidance for emerging disciplines within art studies while emphasizing that studying jianzi pu requires integrating knowledge from various fields rather than confining it solely within the realm of music. Such an approach allows for creative transformation and innovative development of traditional culture.

According to Figure **Error! Reference source not found.**, although research on "jianzi pu" covers multiple disciplines, the largest proportion is still related to music and dance. Considering the limited publication output and collaboration frequency of scholars from independent music institutes (as shown in Figure **Figure 3 Cooperative network analysis of the authors**), it is recommended that scholars from various disciplines in comprehensive universities collaborate more with researchers from independent music institutes. It is believed that such collaborations would lead to more specialized and in-depth exploration of jianzi pu research.

## 4. The article was cited for analysis

### 4.1 The primer analysis

The following table was created based on data from CNKI (China National Knowledge Infrastructure) and selected representative journals for analysis. The search topics included "jianzi pu" and "guqin," with the main focus on "jianzi pu," "guqin scores," and "guqin jianzi pu." Due to only two publications between 1915 and 1980, in order to ensure the relevance, accuracy, and quality of the literature search, the author focused on analyzing highly cited papers published from 1980 to August 2022. This analysis includes information such as the publishing journals, authors, citation counts, topics, institutions involved. It provides an objective analysis and presentation of academic influence through highly cited papers. A total of 46 articles were cited one or more times; these articles were analyzed by the author.

**Table 1** The Article was cited for the analysis

	Chinese musicology	Chinese music	musicology	Music art	Xinghai Academic Express	Symphony (Xi'an Musicology Academy journal	Journal of the Central Conservatory of Music
A collection of cited articles	5 Articles	3 articles	3 articles	2 articles	2 articles	2 articles	2 articles
The cited frequency is pooled	62 Times	16 Times	19 Times	20 Times	16 Times	16 Times	14 Times
Year of cited article	In 1991, In 1992, In 2008, In 2013,	In 2008, In 2017, In 2019,	In 1983, In 2011, In 2012,	In 1983, In 1992,	In 1993, In 2000,	In 1993, In 1999,	In 2016, In 2019,
A collection of core journals	4 articles	3 articles	2 articles	1 article	1 article	1 article	2articles

According to Table 1, it was found that research articles related to jianzi pu are mostly published in journals such as "Chinese Musicology," "Chinese Music," "Journal of Central Conservatory of Music," "Music Research," "Music and Art," "Xinghai Academic Bulletin," and "Symphony (Journal of Xi'an Conservatory of Music)." Among them, the journal "Chinese Musicology" occupies a prominent position, indicating its high publication quality. However, there are relatively fewer cited articles and lower citation rates regarding research on jianzi pu. This reflects that the field of jianzi pu research is relatively niche with limited scholarly attention. There are few scholars engaged in this area, and valuable articles are scarce. Therefore, it is more worthwhile for more people to explore and conduct research in this domain.

In addition to the core journals, the search also revealed that some articles, although not published in core journals, have received high citation counts. For example, the article "Pushi: A Symbol of Culture - Reflections on the Fate of Guqin Scores" [4] by Luo Qin from Shanghai Conservatory of Music has the highest citation count within the search scope with 31 citations. Despite not being published in a high-tier journal, this indicates that this article has gained significant recognition and reflects the author's high level of research competence. It is worth noting that Luo Qin is an ethnomusicologist and music historian who obtained their master's degree from Shanghai Conservatory of Music and Washington University (UW) in the United States and their doctoral degree from Kent State University (KSU) in America. They are a professor at Shanghai Conservatory of Music specializing in ethnomusicology, ancient Chinese music history, and modern Chinese music history. Therefore, this scholar possesses expertise in ancient Chinese knowledge domains with a high level of professionalism. The fact that their article has received the highest citation rate within our search scope further confirms its wide recognition among researchers. Thus, both this scholar and their article deserve attention when researching jianzi pu. Furthermore, there are many similar examples such as Wang Hongmei's "Why Does Guqin Use Jianzi Pu" [5], cited 10 times; Wang Dexun's "The Inherent Contradictions of Notation Methods Using Characters" [6], cited 8 times; Yao Bingyan et al.'s "Qinqu Gouchen · Wu Yeti" [7], cited 7 times; etc.

#### **4.2 Literature co-citation and literature were co-citation for analysis**

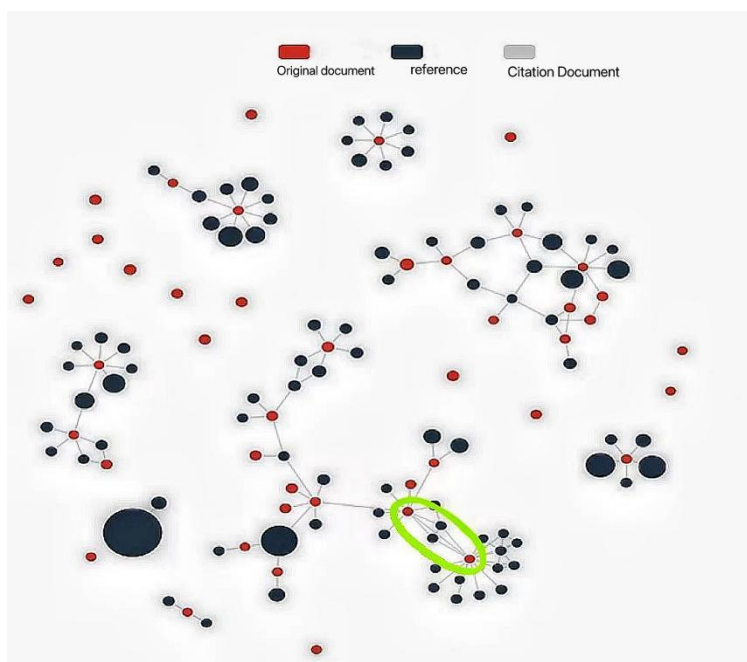
The analysis of literature citations refers to the mutual referencing between new research findings and existing research outcomes, forming a continuously evolving knowledge structure. The integration of these knowledge elements can reveal the structural relationships within the literature, highlighting the interconnectedness and characteristics in terms of research topics, concepts, theories, and methodologies.

When two or more papers are simultaneously cited by the same paper(s), it is referred to as co-citation, and the relationship between these two or more papers is called a co-citation relationship. The number of subsequent papers that cite these co-cited papers is known as the co-citation strength. For example, if Paper A and Paper B are both cited by Papers C and D, they form a co-citation relationship with a co-citation strength of 2 (C and D). Similarly, if Papers A and B are simultaneously cited by Papers C, D, and E, the co-citation strength would be 3 (C,D,E).

As shown in Figure 5, which represents the literature co-citation network of the selected 46 papers, it can be observed that when two or more papers have a co-citation relationship, their co-citation strength is mostly 1. Taking the highlighted section in green circles as an example, there are two original papers (red circles) titled "AI Automated Translation of 'Jianzi Pu': A Case Study on 'Liu Shui' and 'Bu Ran'" and "AI-assisted Dimensionality Enhancement of Guqin Scores." There are also two reference papers (black circles) titled "AI Automated Translation of Nanyin: A Case Study on Classical Masterpiece 'Fu Wei Gong Ming'" and "Deep Learning-based AI Automated Translation of 'Yue Lu Quan Shu': A Case Study on 'Xiang Yin Shi Yue Pu'." These two reference papers form a mutual co-citation relationship with a co-citation strength of 2, indicating a significant relevance between them.

The co-citation strength increases when articles frequently appear together in reference lists, indicating a higher degree of similarity in content and a closer connection between them.

The co-citation strength of literature changes over time, and therefore, exploring the development and evolution trends of a specific discipline can be approached from the perspective of co-citation networks in literature.



**Figure 5** Network diagram of the literature co-citation relationship

According to the literature co-citation and literature co-citation, we can also see which articles are more reference value in which aspects.

**Table** Error! Reference source not found. for co-citation literature analysis

This group of literature	A total of literature
Yu, Hui. "Principle of Computerized Automatic Processing of Pitch Information in Guqin Jianzi Pu." <i>Journal of Xi'an Conservatory of Music (Symphony)</i> . 1993. Ding Xiaojun; Ye Ting; Zhou Changle. Encoding and editing method of guqin subtraction spectrum. <i>Chinese Musicology</i> . 2008 Liu Yang; Tang Yingmin. A structured description method of guqin. <i>Journal of Beijing Information Technology University (Natural Science printing plate)</i> . 2010	Chen, Changlin. "Preliminary Application of Computers in Guqin Music Research." <i>Journal of Computer Science (Computer Journal)</i> . 1989.



<p>Shi, Wangwei. "Differences and Similarities of Four Notation Styles." <i>Journal of Zhejiang Media College</i>. 2008.</p> <p>Jiang, Wei. "Research on Fingerings Symbols in Jianzi Pu from the Perspective of Language and Writing." <i>Chinese Culture Forum</i>. 2015.</p> <p>Sun, Haiyan. "The Principles of Character Creation and Visual Aesthetic Decoration in Guqin Jianzi Pu." 2017.</p>	<p>Editorial Department of "Chinese Music Dictionary," Music Research Institute, Chinese Academy of Arts. <i>Chinese Music Dictionary</i>. People's Music Publishing House. 1984.</p>
<p>Yu, Hui. "Principle of Computerized Automatic Processing of Pitch Information in Guqin Jianzi Pu." <i>Journal of Xi'an Conservatory of Music (Symphony)</i>. 1993.</p> <p>Zhuang, Xiongxiong; Zhou, Changle; Qi, Jingfeng; Gao, Songdi; Lv, Lanlan. "Calculation Method and Software Implementation for Extracting Pitch Information from Guqin Jianzi Pu." <i>Journal of Computer Applications and Software</i>. 2010.</p>	<p>Li Minxiong. <i>Guqin playing the spectrum of shallow interpretation (below)</i>. Musical art. 1983</p>
<p>Wang, Tianyu; Liu, Yan; Wang, Qian. "Digital Research on Intangible Cultural Heritage: Interactive Experience Design and Practice of Guqin Making and Jianzi Pu." <i>Art Science &amp; Technology</i>. 2016.</p> <p>Liu, Yan; Wang, Tianyu; Wang, Qian. "Digital Research on Intangible Cultural Heritage: Interactive Experience Design and Practice of Guqin Making and Jianzi Pu." <i>Art Science &amp; Technology</i>. 2017.</p>	<p>(Ming) Feng Menglong, with a warning statement. The Sanqin Publishing House. 2008</p> <p>Gong Yi. <i>Guqin playing method</i>. Chongqing Press. 2015</p>
<p>Wang, Dexun. "On the Inherent Contradictions of Textual Notation Methods." <i>Journal of Xinghai Conservatory of Music</i>. 2000.</p> <p>Sun, Haiyan. "The Character Creation Principles and Visual Aesthetic Decoration of Guqin Jianzi Pu." 2017.</p>	<p>Wang, Dexun. "The Exemplary Work of Archaeological Study on Kong Fu Music: 'Complete Compilation of Qin Yuan Xin Chuan'." <i>Journal of Xinghai Conservatory of Music</i>. 1996.</p>

For example, in Table 2, the third group includes references to Yu Hui's "Principles of Automatic Computer Processing of Pitch Information in Guqin Jianzi Pu" and Zhuang Xiongxiong et al.'s "Calculation Method and Software Implementation for Extracting Pitch Information from Guqin Jianzi." Both of these works cite Li Minxiong's "An Analysis of Guqin Tablature." Therefore, when we want to understand or study issues related to pitch in Guqin Jianzi Pu, we can refer to Li Minxiong's "An Analysis of Guqin Tablature."

**Table**Error! Reference source not found. Literature were were cited for analysis

This group of literature	A total of literature was cited
<p>Yu, Hui. "Principles of Automatic Computer Processing of Pitch Information in Guqin Jianzi Pu." <i>Symphony: Journal of Xi'an Conservatory of Music</i>. 1993.</p> <p>Li, Mei. "Hidden Wisdom in Guqin Jianzi Pu: Revealing the Development Process of Tuning in Unique Musical Materials Found in Guqin Tablature." <i>Chinese Music</i>. 2008.</p> <p>Li, Cun. "On the Rhythm Issue in Guqin Jianzi Pu." <i>Symphony: Journal of Xi'an Conservatory of Music</i>. 2008.</p> <p>Wu, Zhiwu. "Revisiting Ancient Chinese Jianzi Pu Notation." <i>Music Research</i>. 2011.</p> <p>Wang, Hongmei. "Why Does the Guqin Use Jianzi Pu?" <i>Symphony (Journal of Xi'an Conservatory of Music)</i>. 1999.</p>	<p>Yang, Liqi. "Visual Communication Design in the 'New Guqin Shuanghang Pu'." Beijing Institute of Printing. 2016.</p>
<p>Li, Meiyen. "Gao Luopei's Study on the 'Tiao Yi,' 'Fingering Gestures,' and 'Jianzi Pu' in Guqin Tablature: Focusing on the Discussion in 'Qindao'." <i>Chinese Musicology</i>. 2013.</p> <p>Wang, Dexun. "The Inherent Contradictions of Written Notation Methods." <i>Journal of Xinghai Conservatory of Music</i>. 2000.</p> <p>Anonymous Friend. "Deciphering the 'Heavenly Script': Guqin Jianzi Pu." <i>Music Enthusiast</i>. 1980.</p> <p>Liu Yang and Tang Yingmin. "A Structured Descriptive Method for Symbolization in Guqin Jianzi Pu." <i>Journal of Beijing University of Information Science &amp; Technology (Natural Science Edition)</i>. 2010.</p> <p>Wang Luyang. "Unreadable Guqin Tablature." <i>The Forbidden City Magazine (Zijin Cheng)</i>. 2006.</p>	

Table 3 provides an example of co-citation analysis, which reveals that Yang Liqi's article "Visual Communication Design in the 'New Guqin Shuanghang Pu'" references 10 articles on jianzi pu. Therefore, Yang's article also holds reference value. Moreover, these 10 articles are mutually co-cited with a co-citation strength of 1, indicating a weak correlation.

Based on the analysis of co-citation and co-reference among these 46 literature references, it can be observed that there is some relevance among the retrieved articles, although the

correlation is not strong. Due to limited data availability, it is currently impossible to infer the overall trend of co-reference strength among these 46 literature references and analyze their evolutionary dynamics. It is worth noting that few scholars have analyzed the evolutionary dynamics of literature related to "jianzi pu" from the perspective of co-reference strength. Therefore, in future research, exploring the evolutionary dynamics of literature related to "jianzi pu" from this aspect may provide new insights and discoveries in studying "jianzi pu".

#### 4.3 The academic influence was analyzed from the h index of highly cited papers

The h-index, also known as the h-index, is a hybrid quantitative metric used to evaluate both the quantity and quality of academic output by researchers. It was proposed in 2005 by physicist Jorge E. Hirsch from the University of California, San Diego. According to Hirsch's concept, an individual has an h-index of N if N of their academic papers have been cited at least N times each. Every paper has a probability of being cited. The citation count for papers typically follows a pattern from low to high and then back down again over time, which represents the citation life cycle of a paper. A longer citation life cycle indicates that its academic influence lasts longer and it is more likely to become an important reference. The citation life cycle for journals refers to the duration from when papers published in that journal start receiving citations until they are no longer cited. The longer the citation life cycle for a journal, the greater its relative academic impact.[8] If a scientist's publications are ranked based on their respective citation life cycles, then their h-index represents the maximum value where each of their top-highest-cited papers has been cited at least h times. The h-index is considered a significant improvement over many previous metrics as it avoids bias towards focusing solely on journals where researchers publish their articles. Previous metrics often assumed that authors' contributions were equivalent to average journal levels rather than individual paper levels, leading to biased assessments. In contrast, the h-index objectively reflects an author's actual academic impact.[9]

The following table 4 plots the h-index of the authors with higher citations in these 46 articles

**Table 4** the h-index of the authors with higher citations

author	h index number
Changle Zhou	33
Guangyu Feng	24
Mei Li	12
Jikai Tang	9
Qin Luo	8
Wangwei Shi , ZhiwuWu , and Mohan Zhu	7
Yingmin Tang , Yang Sun , and Xuan Li	6
Wenguang Wu andYan Liu	5
Haifeng Tao	4
Yi Gong , Minxiong Li	3
Qian Wang , Meiyang Li , DexunWang , Cun Li , Haiyan Sun , Chunwei Yang	2
Gong Wang , Jianzheng Li	1

The h-index values obtained for the mentioned authors are based on an analysis of their entire body of literature, which may lead to a certain degree of bias in terms of the literature structure related to the study of abbreviated musical notation. However, based on the data analysis provided above, we observe that most authors relevant to this field have h-index values lower than the average level. Only a few authors have significantly higher h-index values, indicating a high concentration of research output. This finding suggests that research on abbreviated musical notation is still in its early stages and may also reflect a lack of attention and limited involvement from key experts and scholars in this field.

#### **4.4 Key word analysis of the cited articles**

Although "abbreviated musical notation" has a wide range of applications, the scope and themes covered by the 46 highly cited papers mentioned above are relatively concentrated. The author categorized and organized these papers, revealing that theoretical research on abbreviated musical notation primarily focuses on the "guqin" (a traditional Chinese musical instrument) and "musical notation." However, overall, the research on abbreviated musical notation lacks precision and depth. The author believes that future theoretical and research efforts in this field should expand their focus to encompass a broader range of topics related specifically to abbreviated musical notation. There should be increased investment in addressing challenges related to pitch recognition and rhythm interpretation in abbreviated musical notation to enhance academic standards.

### **5. A hot issue of research**

Based on the analysis of these 194 papers, the author found that most of them mention the issue of notation in abbreviated musical notation. Abbreviated musical notation is commonly used in guqin music, and therefore, guqin tablature is a frequently discussed topic within guqin research.

Just as Qiao Jianzhong mentioned in his speech at the opening ceremony of the 4th National Guqin Tablature Conference, "Tablature is a unique creative activity in the field of guqin art and an essential part of developing guqin culture."

Therefore, whether studying abbreviated musical notation or the guqin, research on guqin tablature is still crucial. Liqi Yang<sup>2</sup> from Beijing Institute of Printing mentioned different perspectives on the musical notation forms in abbreviated musical notation that exist in today's music field. Perspective 1: In current guqin teaching and performance, it is common to add staff notation or simplified notation to the abbreviated musical notation for explanation and clarification. This practice subverts the original aesthetics of music and gradually adopts more Westernized notational methods. Perspective 2: Adding staff notation or simplified notation helps address issues like unclear rhythm in traditional abbreviated musical notation and promotes cross-cultural exchange between Eastern and Western music. It is worth advocating for such an approach. Perspective 3: For individuals without a strong foundation in music,

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<sup>2</sup> Liqi Yang. Visual communication design in the "New Guqin double-line spectrum" [D]. Beijing Institute of Printing Technology, 2016.

adding staff or simplified notations further increases the difficulty of reading scores, leading some to suggest abandoning traditional abbreviated musical symbols and learning fingerings from other plucked instruments' notations instead. Yi Li<sup>3</sup> from Guangzhou University also raised this issue while highlighting that exploring the theoretical significance of symbols used in abbreviated musical notation as well as investigating their relationship with sound are important topics within current guqin cultural studies. Mastering the unique characteristics of abbreviated musical notation and applying them to sight-singing instruction would complement existing analytical approaches to understanding guqin tablature. In my opinion, tablature notation should strive for simplicity and clarity while maintaining the original ancient charm and style of abbreviated musical notation. Therefore, adding simplified notation to abbreviated musical notation achieves a balance where it doesn't clutter the score like staff notation does, while still presenting the music quickly and clearly. This approach affirms and promotes the essence of guqin tablature in our country's notational tradition rather than becoming increasingly Westernized. After all, we are learning a traditional Chinese cultural instrument, yet we rely on staff notation for reading scores.

Furthermore, in terms of tablature creation, I believe that the process itself is a form of re-creation of the music. When creating tablature, one should consider phrasing by dividing it according to melodic patterns. The overall tempo should also be determined based on the piece as it influences its charm and artistic conception. Different phrasing divisions, rhythms, and tempos lead to variations in overall musical style. Different qin players may interpret music differently based on their understanding of music theory; each has their own unique characteristics. "Input score" makes every performer become one of the creators of music, actively and creatively explain his personal unique understanding of music, so that the "immutable" score becomes a continuous source and river of music[10]. The scoring of guqin ancient music is actually the adaptation of the original music, or it can be called the "rhythm variation" of the original music[11]. Regarding rhythm during tablature creation, Li Minxiong believes that low-frequency speed combinations should not be overlooked because having more options for speed combinations makes it easier to find optimal methods for expressing musical ideas when creating tablature [12]. A creative spirit guided by rhythmic principles is necessary. Only with a dialectical attitude that balances structure without rigid formalization can guqin scores come alive [13]. At the same time, during guqin tablature creation using abbreviated musical notation, it is important to avoid excessive freedom or arbitrariness but instead emphasize scientific verification procedures while still capturing as much as possible both emotions intended by ancient musicians as well as their artistic conceptions—achieving maximum restoration. During The 2nd China West Lake Guqin Festival & 1st China Guqin Society International Guqin Tablature Conference in 2012, President Gong Yihui emphasized the seriousness and scientific nature of tablature creation multiple times during his opening speech. He stressed the importance of exploring and restoring the original characteristics based on historical context, as well as considering the personality and ideological traits of the composers [14]. There is a close relationship between the white space and the use of "jianzi pu". The elastic beat implied in the guqin music is more free, allowing the emergence of a special scene of thousands of songs, styles and schools, showing the romantic feelings of the ancient guqin people.[13] The white space of reduced character notation not only gives the player more

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<sup>3</sup> Yi Li. Cultural interpretation of Guqin music theory [D]. Guangzhou University, 2018.

space to imagine and create freely, but also gives the listener a different experience and thinking. As the most distinctive feature of Guqin, "white space" will attract more composers and music scholars to explore its mysteries. [15]

## **6. Research status, difficulties and prospects**

Currently, most scholars do not have many issues with recognizing guqin tablature. They have analyzed its structure and emphasized its importance. Although many scholars have discovered the issue of uncertainty in pitch and rhythm in guqin tablature, few researchers have delved into this problem.

This has led to a stagnation in the research on guqin tablature, resulting in limited exploration of its application in guqin teaching and performance. This is also one of the reasons why the development of guqin has been relatively stagnant in China. Therefore, in future research on guqin tablature, scholars should pay more attention to how to break through this dilemma. It is believed that such efforts will lead to a qualitative leap forward in the study of guqin tablature.

Furthermore, from an academic research perspective, the author believes that promoting and popularizing knowledge about guqin tablature across disciplines is also an important factor in advancing research on guqin tablature. By fostering interdisciplinary collaboration and innovation at the cross-disciplinary, cross-institutional, and international levels, knowledge integration can be achieved through academic exchanges. This will allow for permeation and fusion between different disciplines to collectively promote multidimensional development of the knowledge system. The author suggests taking inspiration from interaction design to leverage the high efficiency of computers in order to accelerate its development. For example, there have been studies on octal semantic encoding for digitizing guqin tablature efficiently. Additionally, genetic algorithms involving replication, crossover, and mutation operations could be employed to scientifically generate guqin compositions that are more aligned with popular listening preferences. Through research from different perspectives, it not only compensates for the limitations caused by uncertainty in pitch and rhythm in guqin tablature that prevent many scores from being played properly but also allows these "obscure arts" to break free from fixed thinking patterns so that more people can understand them, learn them actively contribute to their development using various possible approaches.

## **7. Conclusions**

(1) In terms of the publication volume on research related to guqin tablature, there has been a rapid increase since 2016, but in recent years, it has shown a declining trend year by year. Through analysis, it is evident that there are still some issues in the research on guqin tablature. Therefore, we need to continue paying attention to and valuing research on guqin tablature.

(2) Most scholars conducting research on guqin tablature come from comprehensive universities. Although current research on guqin tablature is relatively diversified and continuously explores new aspects, collaborating with music-focused institutions would lead to more specialized and profound exploration of guqin tablature.

(3) Currently, research on guqin tablature is in a stagnant state, and there are few researchers dedicated to its study. Besides, in terms of education, due to the shortage of talents, the aging of the inheriting population, and the boring process of learning guqin [16], the inheritance and development of the "jianzi pu" face great difficulties. However, as guqin tablature represents the embodiment of Chinese culture and wisdom, it is our responsibility as young people in contemporary China to shoulder the task of inheriting and developing the traditional notation system of China. This duty bestowed upon us by the era also serves as our mission. We need to establish ourselves on this vast land, rooted in a millennia-old culture, diligently cultivate it with unwavering focus, and continuously innovate. Mr. Qu Junhong, Executive Director of the Chinese Guqin Society and Director of Lingnan Tianhong Qin Museum said: "The guqin is a cultural heritage left by our ancestors—a historical treasure with the longest history and most complete artistic system in China. It has been recognized as an intangible cultural heritage by UNESCO for ten years now. As inheritors of this cultural heritage, it is incumbent upon us to organize it properly while protecting and promoting its development." [17] In my future studies too, I will continue paying attention to guqin tablature research while also urging those around me not only to value guqin tablature but also increase their appreciation for traditional Chinese culture. I believe that through ingenious craftsmanship skills we can ignite sparks that intertwine classical traditions with modernity—thus consolidating powerful spiritual forces towards realizing the great rejuvenation of the Chinese nation's "Chinese Dream."

## References

- [1] Shang Hong: "A Discussion on Contemporary Guqin Music," *Journal of Xinghai Conservatory of Music*, 2003, Vol. 1, pp. 48-51.
- [2] Zhou Changle, Qi Jingfeng, Zhuang Xiongxiang, Lü Lanlan, Gao Songdi: "Methods for Processing Guqin Tablature Graphics under Windows," *Computer Engineering Journal*, 2010, Vol. 36(5), pp. 279-281.
- [3] Zhang Yingli and Liu Hong: "A Genetic Algorithm-Based Method for Generating Guqin Songs," *Information Technology and Informatization Journal (ITI)*, 2018, Issue 9, pp.28-30.
- [4] Luo Qin: "Push: A Symbol of Culture—Reflections on the Fate of Guqin Tablature," *Chinese Musicology Journal (Zhongguo Yinyuexue)*, 1991, Vol.1, pp.52-60.
- [5] Wang Hongmei: "Why Use Jianzi Notation in Guqin?" *Symphony (Journal of Xi'an Conservatory of Music)*, 1999, Vol.2, pp.23-25.
- [6] Wang Dexun: "On the Inherent Contradictions in Textual Notation Methods," *Journal of Xinghai Conservatory of Music*, 2000, Vol.3, pp.11-14.
- [7] Yao Bingyan, Lin Youren, Zhou Zimu: "Qin guo chen Wuyeti", *Music Research*, 1983, No.4, pp.83-91.
- [8] Wei Ruibin, Tian Dafang, Wu Yishan: "Comparative Study on Citations Based on Citation Lifecycle", *Library and Information Work (Tushu Qingbao Gongzuo)*, 2014, Vol.58, No.1, pp.79-85.
- [9] Cheng Han, Xiang Liang: "Analysis of Academic Influence of Highly Cited Papers Based on Ethnic Vocal Music", *Library and Information (Tushu yu Qingbao)*, 2013, No.6, pp.123-126.
- [10] Tian Qing. *The Cultural Connotation of Guqin*. China Political Consultative Conference, 2021, Vol.386, No.11, pp.78-79.
- [11] Gao Weijie: "Guqin: Simplified Notation and Tablature". *People's Music*, 2022, Vol.713, No.9, pp.29-31.

- [12] Li Minxiong: "A Brief Explanation of Guqin Tablature (Part 2)," Music and Art, 1983, Vol. 1, pp.42-53.
- [13] Jin Maojun: "New Ideas for Tablature Notation, Bringing New Life to the Guqin—The Conclusion of the Guqin Summit in Hangzhou," Qintong Magazine, 2013, Issue 2, pp.73-75.
- [14] Wang Shangying. Methodical and Measured: A Brief Introduction to the Rhythmic Notation of Guqin's Simplified Tablature. Art Evaluation, 2021, Vol.625, No.2, pp.4-8.
- [15] Yin Peiyi. The Beauty of "Blank Space" in Guqin Art. Popular Literature and Art, 2023, Vol.556, No.10, pp.48-50.
- [16] Zhao Guangqiang. Development Status and Reflections on Guqin Education. Music World, 2021, Vol.764, No.9, pp.46-49.
- [17] Wen Yifei and Wang Xiaolong: "Summary of the '4th China Guqin Art Festival' Tablature Workshop," Music Time and Space Magazine (Yinyue Shikong), 2014, Issue 8, pp. 88 -90.