From Isolation to Interconnection of Judicial Case Data: A Framework for Integrated Digital Court System Development

Authors: Lin Chengduo, Cai Zonghan, Zhang Baowen, Song Zhijia, Zhao Yunhui, Deng Qingyue

Date: 2024-11-04T10:07:30+00:00

Abstract

With the development of big data and intelligence, ensuring "justice and efficiency" through digital justice and accelerating digital court construction has become the contemporary mission of the judiciary. Based on multiple considerations regarding the characteristics of contract and quasi-contract disputes related to personal information protection, as well as the scarcity of research associated with big data and the internet that makes it difficult to respond to the trend of "building digital courts," this study employs social network analysis methods to analyze effective judgments concerning personal information protection in credit card disputes in Beijing from 2022 to 2024 and establish a database. Through analyzing relationship network indicators of applicable laws and regulations, it can clearly demonstrate the laws, regulations, and their connections applicable to this type of dispute in both substantive and procedural aspects in China, providing a methodology for remedying defects in current digital court classification systems, improving the current situation of weak case relevance, and assisting judges in adjudication, which holds practical significance for improving judicial adjudication efficiency, constructing similar case retrieval databases, and building integrated digital court systems.

Full Text

From Isolation to Connection of Judicial Precedent Data: An Integrated Digital Court System

Abstract: With the development of big data and artificial intelligence, accelerating digital court construction to safeguard "justice and efficiency" through digital justice has become the contemporary mission of courts. Considering the characteristics of contract and quasi-contract disputes related to personal

information protection, along with the limited research on their intersection with big data and the internet, which fails to respond to the trend of "building digital courts," this study introduces social network analysis to examine effective judgments on personal information protection in credit card disputes in Beijing from 2022 to 2024. By analyzing the relationship network indicators of applicable laws and regulations, the study clearly demonstrates the current legal framework and connections governing such disputes in both substantive and procedural law, offering a methodology to remedy defects in existing digital court classification systems, improve weak case correlations, and assist judicial decision-making. This approach holds practical significance for enhancing judicial efficiency, constructing similar-case retrieval databases, and building integrated digital court systems.

Keywords: digital court; credit card dispute; personal information protection; social network analysis

(I) Research Background

In recent years, the trend of strained judicial resources in China has intensified, with the growth rate of dispute cases far exceeding that of judicial resources. The fundamental reality of "many cases, few personnel" has become a major obstacle to court operations. In 2022, grassroots court judges handled an average of 274 cases each, with nine provinces exceeding 300 cases per judge and the highest surpassing 400 cases. Amidst immense adjudication pressure and increasingly tight judicial resources, digital transformation of courts has become essential to optimize litigation efficiency, improve trial quality, alleviate the case-personnel contradiction, and provide greater intellectual support for judges. Digital court construction represents the advanced stage of this digital transformation.

As this paper argues, "Digital court construction essentially involves comprehensively applying big data thinking to optimize and innovate existing working methods through massive judicial data, thereby promoting high-quality development of court work. This is achieved by establishing a systematic framework across five major platforms: 'data-assisted adjudication, data-assisted supervision, data-assisted public service, data-assisted governance, and data-assisted administration.' " At the 2024 Two Sessions, Supreme People's Court President Zhang Jun emphasized that through digital courts, efficiency and quality should be enhanced, striving to enable all 3,500+ courts nationwide to handle cases on "a single network." Courts must complete the transformation from "traditional manual experience" to "data scientific analysis" to address typical challenges in traditional adjudication, including inconsistent legal application, procedural delays, and judicial integrity risks.

Local courts are actively exploring digital court initiatives. In Beijing, for instance, online filings in the first half of 2022 accounted for 82.9% of all new civil and commercial cases, demonstrating early exploration of digital and big data applications in the trial process. In 2023, the Shanghai High People's

Court took the national lead in proposing and comprehensively deploying "digital court" construction. Currently, the construction system, operational model, and advancement path of digital courts have basically taken shape, with the foundational framework established and the effectiveness of application scenarios gradually emerging.

This study's significance lies in innovatively applying textometric methods and social network analysis to form a judicial information network, with its paradigmatic outcomes applied to the construction of foundational trial databases for digital courts. Theoretically, it analyzes the advantages and limitations of this method in addressing current digital court challenges and identifies directions for optimization. Practically, it offers potential solutions to challenges such as imperfect trial quality inspection systems and insufficient depth in judicial data mining. By linking similar case judgments, this model can help build more precise typified case databases and judicial data networks, enabling judges to quickly locate relevant legal provisions, summarize patterns and experience through case comparisons, and provide effective tools for supervising trials and improving case quality, thereby promoting the improvement of digital court systems.

Furthermore, this study finds that the elemental and automated characteristics of digital courts can be combined with small-claims and summary procedures to further enhance trial efficiency, aligning well with the typical features of credit card personal information protection disputes. Based on this, this paper examines credit card personal information protection dispute cases using social network analysis to explore its application in digital court construction, aiming to address the "many cases, few personnel" challenge, improve judicial efficiency, and promote judicial fairness.

(II) Characteristics of Credit Card Disputes and Their Relevance to Digital Court Applications

1. High Volume of Disputes Urgently Requiring Digital Technology Empowerment to Alleviate the "Many Cases, Few Personnel" Dilemma In credit card dispute judicial practice, unavoidable overlap or conflict between user personal information and credit card collection data frequently triggers personal information infringement issues. The number of tort lawsuits filed by cardholders against banking financial institutions or their entrusted collection agencies for infringing on debtor personal information remains high. From 2018 to 2021, national credit card personal information protection disputes exceeded 1,000 cases annually, showing a year-on-year growth trend. This means that applying digital courts and digital technology for intelligent, batch adjudication can reduce the workload of manual trials and alleviate the current "many cases, few personnel" adjudication reality.

2. Disputes Involving Standardized Terms and Summary Procedures Facilitating Digital Batch Processing for Efficient Adjudication Re-

search shows that over time, credit card contract disputes increasingly apply summary procedures. From January to August 2022, Beijing's Xicheng District People's Court concluded 51,013 first-instance civil and commercial cases, of which 27,252 were resolved through small-claims or summary procedures, accounting for 53.42% of first-instance cases, reflecting recent judicial hotspots.

Using PKULaw as the source for judicial documents, this study conducted a preliminary screening of national and Beijing personal credit card dispute cases from 2020 onward, obtaining line charts for total case numbers and summary procedure case numbers as shown in Figure 1 [FIGURE:1] and Figure 2

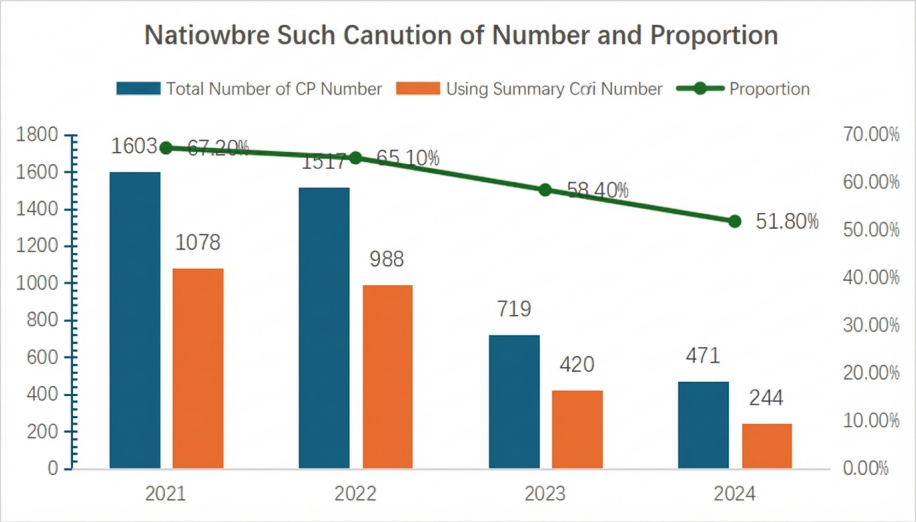

Figure 1: Figure 2

.

Figure 1 National Summary Procedure Case Numbers and Proportions (Compiled by Author)
Figure 2

Beijing Summary Procedure Case Numbers and Proportions (Compiled by Author)

The figures reveal that nationwide, credit card personal information protection cases applying summary procedures maintain around 50-60% of the total. This stems from three factors: First, China's Civil Procedure Law stipulates that simple civil cases with clear facts, explicit rights and obligations, and minor disputes may apply summary procedures. In common credit card collection disputes, parties form a credit card service contract relationship representing their genuine intent. If the contract content doesn't violate mandatory legal provisions, the contract is valid, and the cardholder should fulfill contractual

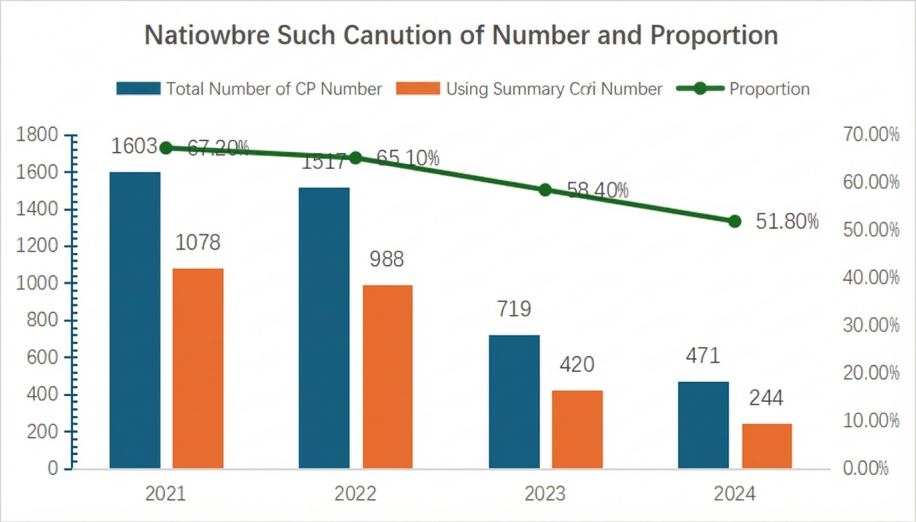

Figure 2: Figure 2

obligations. Without objection from the cardholder, facts are clear and disputes minor. Second, this study finds that credit card service contracts predominantly use long-term standardized terms with basically clear rights and obligations and obvious homogenization characteristics.

Due to these three features—clear facts and low resolution difficulty in dispute content, standardized terms with explicit rights and obligations, and applicability of summary procedures for efficiency—credit card personal information protection disputes are well-suited for batch adjudication using big data in digital courts. Therefore, this study uses credit card personal information protection disputes as a case study to examine social network analysis applications in digital court intelligent trial systems.

(III) Current Status of Laws and Regulations on Digital Courts

Legislatively, in July 2016, the General Office of the CPC Central Committee and the State Council issued the *National Informatization Development Strategy Outline*, listing "smart court" construction in the national informatization development strategy and explicitly proposing requirements to improve informatization levels across all judicial links and promote law enforcement and judicial information disclosure. In 2017, the Supreme People's Court issued *Opinions on Accelerating Smart Court Construction*, proposing development directions for digital court construction in information services: establishing big data analysis systems, developing intelligent services for the entire judicial process and multiple dimensions, and building AI-assisted decision-making systems. On December 9, 2022, the Supreme People's Court issued *Opinions on Regulating and*

Strengthening AI Judicial Application, further promoting the integration of AI and judicial work. China has been continuously advancing digital court legislative practice in recent years, with regulations moving toward specialization and detailed specification.

Table 1 Current Legislative Status of Digital Courts (Compiled by Author)

(IV) Research Status of Digital Court Intelligent Trial Systems

Research reveals that in judicial practice, digital court intelligent trial systems have achieved preliminary application, mainly falling into three categories: First, auxiliary adjudication tools developed for specific case topics that screen case elements to help judges quickly grasp focal points and evidence priorities, improving trial efficiency. Examples include Shanghai courts' "Shareholder Right-to-Know Dispute Element-Based Trial Assistance Model" and "Execution Termination Case Property Investigation and Control Prompt Warning (Housing Fund)" data model. Second, comprehensive tools for trial procedures that assist manually throughout all trial stages. For instance, Xicheng District Court's case evaluation system "features random case assignment, automatic electronic file association, and case type marking functions," and its intelligent procedural control robot "can automatically collect party information and initiate execution property investigation procedures through big data analysis to assist in enforcing judgments." Third, optimization and supervision tools for trial procedures that standardize litigation procedures and correct procedural irregularities. For example, Shanghai courts have established procedural supervision scenarios for irregularities in filing, service, and execution, such as "prompts for failure to lift restrictive measures after execution completion," "prompts for service defects in public notice cases," and "prompts for refunding litigation fees to winning parties."

Academically, research on legal application analysis and decision modules in digital court intelligent trial systems has mostly focused on theory, lacking corresponding visualization model support. For instance, Wang Shixuan (2024) proposed abstracting the constitutive elements of case facts and the relativity of legal facts in data-assisted adjudication to achieve digitalization of legal norms. Sun Yue and Chen Yong (2023) suggested introducing generative AI technology based on pre-trained language models (GPT) to extract judicial case text information.

Regarding case application models, in civil law countries like Germany, the case application 思维模式 follows "analogy-induction-deduction." As a statutory law country, China can also adopt this analogical process to construct a legal thinking model for similar-case retrieval: first, finding precedents similar to the case at hand; second, inducing general adjudication characteristics beyond individual cases to explore judicial logic and build similar-case adjudication rule models; third, applying deductive reasoning to connect with case facts and assist the judicial trial process.

In summary, in application, digital court intelligent trial systems mainly fall into the three categories above, with fewer exploratory auxiliary adjudication models for legal application. Academically, research mostly focuses on directional theoretical studies. This paper argues that establishing a judicial information database through textometric social network analysis can assist digital courts in case typification, intelligent legal application, and information database construction. Therefore, to explore the application possibilities of this database in digital court intelligent trial systems and promote the development of auxiliary adjudication models in digital court construction, this study conducts trial model construction and analysis.

(V) Research Objectives

Based on the above discussion, this study uses credit card personal information protection disputes as an example, social network analysis as the methodological foundation, and effective judgments published from 2022-2024 in Beijing as data sources to construct a legal relationship network model. By analyzing key nodes in legal application regarding credit card personal information protection contract disputes and forming a similar-case retrieval database, this research aims to explore digital solutions to current bottlenecks in isolated applications of large-scale judicial precedent data, enhance judicial efficiency, and promote judicial fairness.

This study primarily addresses three digital court application issues: First, exploring rights and obligations pathways in credit card personal information protection contract disputes to help analyze case facts, grasp dispute focal points, and complete case typification. This addresses the current characteristic of insufficiently clear and precise case classification in digital courts, helping establish intuitive dispute typification and specialized case classification judicial databases. Second, addressing the current shortage of auxiliary adjudication models exploring legal application in digital courts, this paper constructs a credit card personal information protection adjudication network based on model analysis results, studying actually applied laws and correlations between provisions to provide more precise legal application analysis and avoid "different judgments for similar cases." Third, addressing the current situation where information data in judicial databases is relatively isolated with weak connections, this study helps establish clearly visualized similar-case retrieval information databases, promotes integrated system construction, and explores application pathways and advantages of social network analysis in solving social problems.

The overall structure of this paper is shown in Figure 3

.

Figure 3 Overall Structure of This Study (Compiled by Author)

Document Name	Issuance Date	Content Involved
Outline of National Informatization Development Strategy	2016-7-27	Build "smart courts", improve the informatization level of links such as case acceptance, trial, execution, supervision, etc., promote judicial openness, and advance judicial fairness.
Opinions of the Supreme People's Court on Accelerating the Construction of Smart Courts	2017-4-12	Establish a knowledge-centered artificial intelligence auxiliary decision-making system. Utilize big data to serve judicial decision-making, combine trial dynamic analysis and judicial statistics intelligent analysis, and the timeliness and pertinence of judicial decision-making.
Opinions on Regulating and Strengthening the Judicial Application of Artificial Intelligence	2022-12-09	Further promote the deep integration of artificial intelligence technology and judicial work, accelerate the construction and integration of judicial databases, data service platforms, judicial knowledge bases, artificial it engines, knowledge service platforms, and judicial blockchain platforms.
2024 Supreme People's Court Work Report	2024-03-08	Vigorously grasp quality and efficiency improvement, and accelerate the modernization of trial work. Empower quality and efficiency improvement with digital courts, solving typical problems of traditional courts.

Figure 3: Figure 3

II. Model Overview

(I) Methodology

Social network analysis originated in the 1930s-40s, with its concept developing over decades. A social network is a relatively stable system formed by social relationships among certain individuals. Chinese scholar Fei Xiaotong's 1938 *Peasant Life in China* used social network concepts to analyze interpersonal relationships in rural communities, considered a pioneering Chinese work in social network analysis. Social network analysis (SNA) is a set of norms and methods for analyzing social relationship structures and their attributes, focusing on the structures formed by different social units (individuals, groups, or societies) and their properties. Combining social network analysis with empirical analysis integrates overall descriptive problem indicators with dynamic research to enhance persuasiveness. Recently, most scholars have established community networks through social network analysis to examine influence and correlation characteristics among individuals. For example, Zhang Zhengfeng and Zhang Dong (2023) used social network analysis and exploratory spatial data analysis to partition carbon emission/sequestration spatial correlations at the county level in the Beijing-Tianjin-Hebei region, providing a pathway for carbon balance zoning at the county spatial scale. Similarly, Si Mengmeng, Chen Ya, and Sun Ning (2024) studied the correlation relationships of co-cultural service spaces in Beijing-Tianjin-Hebei through social network analysis to examine network structural characteristics of this specific spatial development. Based on current research, this study finds that social network analysis is commonly applied in academia to study correlation effects among multiple factors within a spatial scope, thereby discovering relationships and researching overall network structural features.

With model application promotion, researchers gradually applied social network analysis to the legal field. Combining social network analysis with legal research can analyze pathways of law-society interaction or specific legal implementation

through law application. Exploration of social network analysis in legal research has concentrated in the past decade. For instance, Masías (2016), after comparing logistic regression, Bayesian networks, and random forest methods, concluded that social network analysis is the most effective method for modeling criminal behavior in analyzing criminal law and punishment relationships. Similarly, Miao Weishan, Jiang Min, and Pang Yunxia (2022) used content analysis and social network analysis to conduct meta-analysis of 358 internet-related policy documents, revealing changes in China's internet governance priorities and characteristics. Legal research aided by social network analysis can better discover connections among different regulations and policies within the same field. After comprehensively reviewing prior literature, this study believes that establishing databases analyzing citation patterns of laws and regulations through social network analysis can summarize legal implementation, using large-scale legal practice judgment data as the analytical basis to address the lack of empirical validity in current legal research.

This study argues that social network analysis, by constructing relationship network models describing node characteristics, connections, and network properties, can research legal implementation in specific litigation fields, thereby assisting in determining judicial trial logic and contributing to digital court similar-case retrieval database construction and specialized dispute classification database formation and improvement. For credit card contract dispute cases exhibiting typified cause-of-action characteristics, constructing social networks can clearly reveal overall adjudication logic, reduce time and labor costs in similar-case judgments, and provide feasible pathways for issuing adjudication guidelines.

(II) Research Sample and Procedure Description

Using PKULaw as the judicial document source, this study searched for credit card contract dispute cases with Beijing courts as the trial venue and judgment dates from January 1, 2022, to September 30, 2024, obtaining 49 judgments. After removing 1 duplicate judgment, social network analysis was conducted on the remaining 48 judgments. Based on this social network model, a legal citation network for court trial practice was established to analyze citation patterns of laws and regulations in specific adjudication practice, studying the applicability and importance of relevant legal provisions and overall network characteristics to understand the common adjudication logic in credit card contract disputes over the past three years and facilitate overall grasp and analysis.

Figure 4 [FIGURE:4] Legal Document Screening Flowchart (Compiled by Author)

The procedure is as follows: First, establish a database from the initially screened 48 documents; second, use UCINET software to construct matrices and form citation network diagrams, calculating various indicators; finally, derive relevant analysis and conclusions based on the indicators.

(III) Data Network Overview

A social network consists of connections among multiple different nodes. Measurement methods include tie measurement, individual measurement, and overall network measurement. Individual measurements include node degree and betweenness, while overall network measurements include size and density. This study focuses on these two types of indicators to analyze the constructed network: using laws and regulations cited in judgments as nodes and co-occurrence of different laws and regulations in the same judgment as connections, establishing a database from the collected and screened 48 judgments.

(IV) Individual Indicators

1. Node Degree Node degree refers to the number of nodes directly connected to a certain node. Node degree can measure an individual's position in a social network (higher degree indicates more central position and greater dominance), representing an important individual structural feature in networks. In the legal citation network constructed in this study, if a legal provision has the highest degree, it is considered central, indicating more frequent citation in specific trial practice and core status in handling credit card contract disputes.

2. Betweenness Betweenness measures the extent to which a node in a social network lies "between" other points. In the network established in this study, legal provisions with higher betweenness have stronger control over other legal provisions. Meanwhile, the contract content risks implied behind such legal provisions constitute the "key intermediary risk" of the dispute network, controlling which can control the occurrence of the entire risk network.

The betweenness calculation formula is:

$$C_B(n_i) = \sum_{j<k} \frac{g_{jk}(n_i)}{g_{jk}}$$

where $C_B(n_i)$ is betweenness, g_{jk} is the number of shortest paths between nodes j and k, $g_{jk}(n_i)$ is the number of shortest paths from j to k passing through node i, and g is the total number of nodes in the network.

(V) Overall Network Indicators

(1) Size Size refers to the number of nodes contained in a social network. Network size affects relationships among nodes. In this study, size represents the total number of laws and regulations appearing in the sample (credit card contract dispute judgment database). Larger network size means more cited legal provisions, indicating more diverse risk types.

(2) Density Density refers to the degree of connection among nodes in a social network. Greater density indicates closer relationships among legal provisions,

meaning two or more legal provisions are more frequently cited together in the same judgment.

The density calculation formula is:

$$D = \frac{L}{g(g-1)}$$

where D is network density, L is the number of existing edges, and g is the number of nodes in the graph.

III. Establishment and Analysis of Legal Citation Network

(I) Analysis of Rights-Obligations Relationship Diagram Based on Theory

From current academic research, scholars such as Xu Yun and Chen Yue typically summarize the legal relationship between card issuers and holders as four types: savings loan relationship, consumer credit relationship, entrusted agency settlement relationship, and guarantee relationship, briefly analyzing the basic meaning of each. Among these, the consumer credit relationship—where cardholders must repay principal and interest on schedule after overdraft—most closely aligns with this study's focus. Unfortunately, existing literature rarely clarifies the rights and obligations of each party, with few in-depth analyses. Regarding personal information protection, Xie Ni points out that standardized terms in credit card contracts may pose hidden dangers to personal information security when handling personal information use and custody. Chang Liying similarly notes that current credit card collection models carry risks that may lead to user personal information leakage.

Combining the above research findings and the Supreme People's Court's *Provisions on Several Issues Concerning the Trial of Bank Card Civil Dispute Cases* (hereinafter "the Provisions"), rights and obligations in personal information protection-related credit card disputes are relatively clear and suitable for transformation into a rights relationship diagram. Specifically, in credit card service contracts, cardholders are obligated to repay overdraft principal and interest on time and enjoy rights to consumer credit and supervision of collection behavior. Issuing banks have the right to entrust and supervise external collection agencies for overdue debts while bearing the obligation to protect cardholder information security. External collection agencies are responsible for collecting overdue debts, must regularly report progress to the entrusting bank, and protect cardholder privacy. Based on the above, this study has drawn a social network diagram based on rights and obligations (Figure 5

).

Figure 5 Schematic Diagram of Credit Card Rights-Obligations Relationship (Compiled by Author)

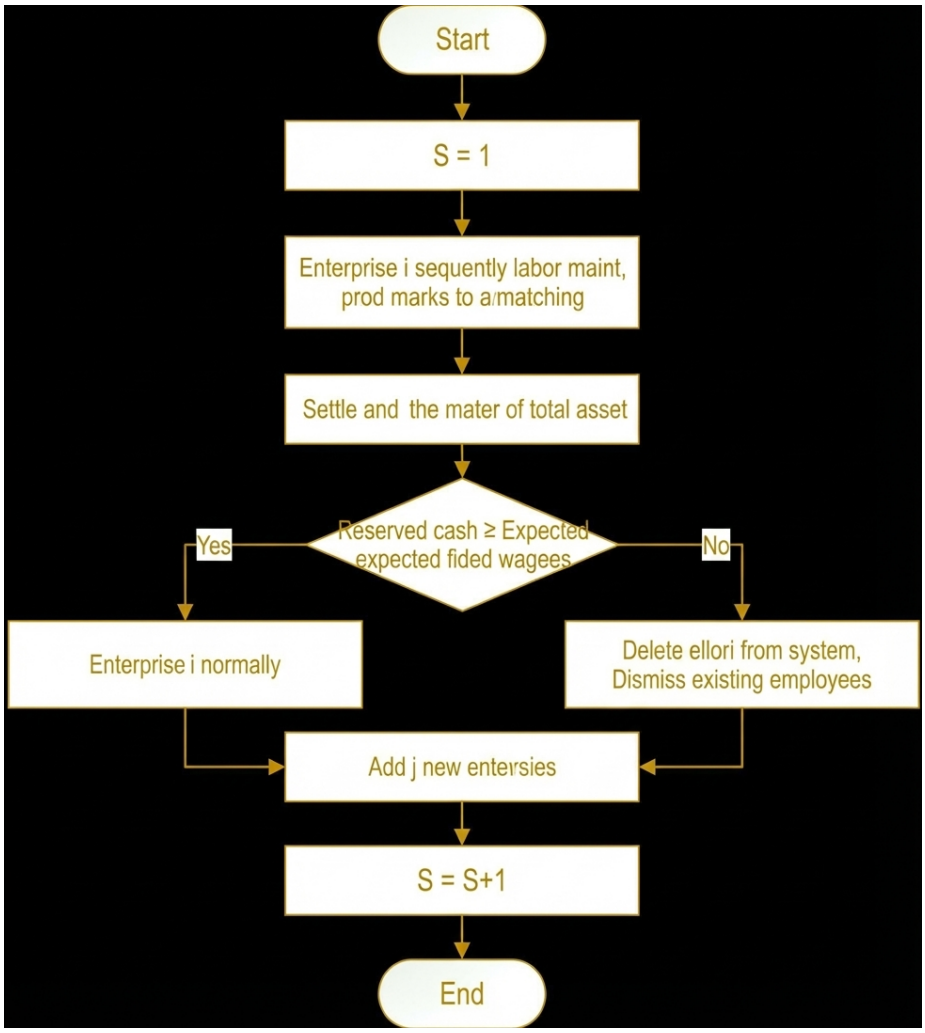

Figure 4: Figure 5

(II) Results Analysis

1. Construction of Credit Card Contract Dispute Risk Network Based on Legal Citation Patterns In the legal citation network, using relevant laws and regulations as rows and 48 judgments as columns, an affiliation matrix was constructed. Matrix element X_{ij} represents whether legal provision i appears in judgment j (1 if present, 0 if absent), forming a 2-mode "laws and regulations-judgments" relationship matrix. Using UCINET software, a legal citation network graph $G(N, K)$ was constructed, where N is the number of network nodes and K is the number of weighted network connections. The visualization result is shown in Figure 6

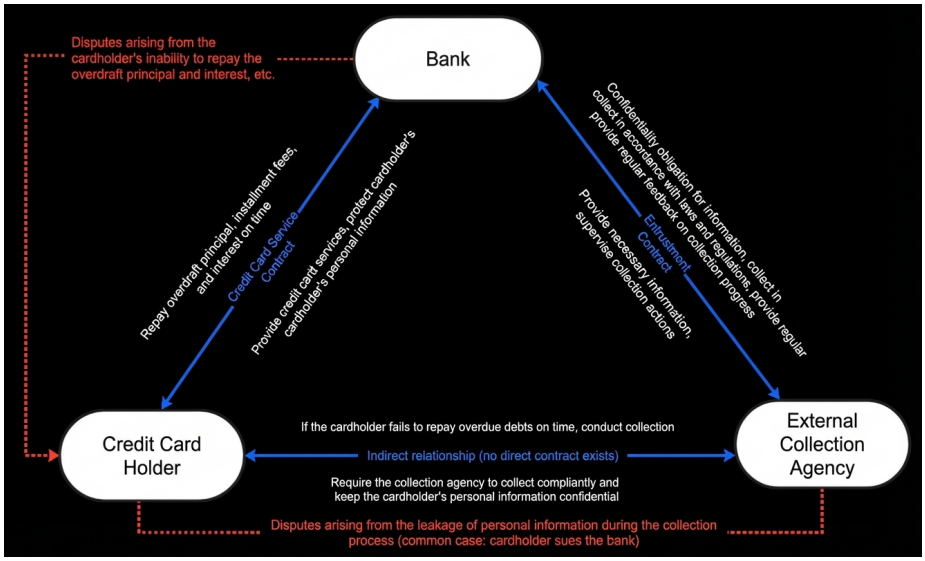

Figure 5: Figure 6

.

Figure 6 Legal Citation Network in Credit Card Contract Disputes Tried by Beijing People's Courts and Subordinate Courts (Compiled by Author)

In Figure 6, quadrilateral QMDH forms a separate graph without connections to any other nodes (laws and regulations). Analysis reveals all four belong to the same case: *First-instance Civil Judgment on Credit Card Dispute between Agricultural Bank of China Co., Ltd. Beijing Shunyi Branch and Jin Yong.* After reviewing, the authors believe this case differs significantly from others in cause of action and complexity, thus it was excluded from subsequent analysis.

Table 2 Node Degree and Betweenness of Relevant Laws and Regulations (Compiled by Author)

2. Calculation of Credit Card Contract Dispute Network Indicators Based on Legal Citation Patterns Using UCINET software to calculate individual structural indicators of the substantive legal citation network, node degree and betweenness were computed. Relevant laws and regulations' node degree and betweenness are shown in Table 2.

Meanwhile, overall network indicators are calculated as shown in Table 3:

Table 3 Overall Network Indicators (Compiled by Author)

Wellman's analysis of network density suggests that when density is between 0-0.25, relationship density is low (sparse connections). Based on this, the legal citation network for credit card contract disputes in Beijing from 2022-2024 has relatively dense connections, indicating strong correlations among various laws and regulations. This suggests high credibility in inferring common adjudication logic from this network.

3. Reliability Test To ensure research result reliability and consistency, this study employs Cronbach's Alpha reliability coefficient for reliability testing, calculated using SPSSAU software. Results are shown in Table 4.

Table 4 Cronbach's Alpha Reliability Coefficient Test Results (Compiled by Author)

Table 4 shows that BA, PC, and SN have a Cronbach's Alpha coefficient of 0.586, greater than 0.5 but less than 0.6. However, since the scale consists of only two items, this indicates acceptable data reliability quality. Regarding "CITC values," all analysis items have CITC values greater than 0.5, indicating good correlation between items and good reliability levels, demonstrating satisfactory internal consistency reliability of variables. In summary, the research data used in this study possesses certain reliability and can serve as a basis for further research.

4. Analysis and Interpretation of Legal Relationship Network Model

4.1 Overview of Legal Relationship Network Model Analysis Purpose

The legal relationship network model constructed based on social network analysis connects and analyzes large numbers of similar-case effective judgments. Using this network, judges in digital courts can reference relevant legal provisions during case handling to assist adjudication, thereby realizing the "data-assisted adjudication" function of digital courts. Standards for similar-case determination are based on three elements: "essential facts," "dispute focal points," and "legal application." From the "legal application" perspective, the legal relationship network model results contain issues requiring further discussion and clarification. Without such research and explanation, they may affect judges' reference and judgment in smart courts. Therefore, to enable digital courts to better assist judges in hearing similar cases, this study intends to conduct pre-

liminary analysis of existing legal relationship network model results formed by effective judgments before analyzing the model's integrated functions.

4.2 General Analysis of Legal Relationship Network Model In the legal relationship network, degree and betweenness show positive correlation. As previously mentioned, nodes with higher degree and betweenness have greater control over other laws and occupy more central positions in the network. Nodes A, C, and G have the highest degree and betweenness, with appearance frequencies reaching or approaching 50% in the legal relationship network, indicating these provisions constitute main components of adjudication logic.

In the social network formed by laws and regulations cited in personal information-related bank card disputes, connections among nodes are relatively close, meaning laws and regulations are frequently co-cited in the same judgment. Meanwhile, nodes A, C, and G have significantly higher degree and betweenness, occupying more central positions in this type of adjudication logic. Additionally, network construction can quickly exclude mismatched case types. For example, after establishing a network based on credit card contract disputes, nodes completely disconnected from the overall network (like quadrilateral QMDH in Figure 3) can be identified and confirmed to have obvious differences in cause of action from other cases, enabling rapid screening from similar-case databases. In other words, network usage provides a possible pathway for rapid case classification.

4.3 Specific Analysis Content First, personal information protection-related credit card dispute cases exhibit typified distribution characteristics. As shown above, the network density indicator exceeds 0.3, indicating aggregated distribution patterns of cited laws and regulations with relatively close connections. In other words, the adjudication logic of the studied cases shows strong commonalities, forming typified adjudication logic. Based on this, we can preliminarily determine that Beijing credit card contract dispute cases have high adjudication consistency, making them suitable for establishing similar-case retrieval databases. Such databases have strong universality and can form systematic adjudication guidelines for similar disputes.

Second, provisions on the temporal effect of *Civil Code* application occupy the most central position in the legal relationship network. In the network, node A has the highest degree and betweenness, with the "degree" indicator reaching 12 and the "betweenness" indicator exceeding 32. In other words, most effective judgments studied cite this provision. Based on this, the study finds that statute of limitations issues relate to personalized installment repayment agreements. In 2011, the *Commercial Bank Credit Card Business Supervision and Administration Measures* Article 70 proposed provisions on personalized installment repayment agreements, allowing issuing banks to negotiate such agreements with cardholders when they cannot repay but demonstrate willingness. In 2022, the China Banking and Insurance Regulatory Commission and the People's Bank

of China supplemented and reiterated this provision, prohibiting re-installment of funds already under installment, clarifying maximum installment periods of 5 years, and strengthening standardized management. Consequently, credit cardholders may have been unable to repay overdrafts before the *Civil Code* enactment, but litigation activities were delayed until 2022 or 2023 (after the *Civil Code* took effect), involving disputes over applicable law. Thus, frequent citation of *Civil Code* temporal effect provisions is explainable. Additionally, despite the original *Contract Law*'s expiration in 2021, its provisions remain frequently cited in judgments—a phenomenon also explainable through this analysis.

Third, general provisions from the original *Contract Law* occupy important positions in the legal relationship network. In the network, Articles 60 and 107 of the original *Contract Law* (corresponding to nodes C and G) have significantly high degree and betweenness, with both provisions co-cited in multiple cases. By contrast, the *Provisions* have low degree and betweenness indicators. Analysis of original *Contract Law* provisions reveals: Article 60 stipulates comprehensive contract performance principles and ancillary obligations, while Article 107 specifies basic breach forms and liability types. The *Provisions* were formulated against the backdrop of rapid internet finance development to address issues like bank card fraud, overdraft interest fees, and penalty collection. Bank card disputes involve multiple categories including fraud, overdraft fees, and penalty collection. Personal information protection-related credit card disputes studied here represent only one type. Combined with the *Provisions*' background and content, they have limited relevance to this dispute type, while original *Contract Law* content is more suitable for resolution. Therefore, judicial practice cites more original *Contract Law* provisions rather than the *Provisions*.

Table 5 Three-line Table of Laws and Regulations (Compiled by Author)

4.5 Application Prospects Social network analysis application in the legal field plays an important role in case classification and trial efficiency improvement during modern digital court construction.

By applying social network analysis in case management systems, the trial process can be further streamlined, reducing trial time and labor costs. First, dynamically collect judgments with timeliness (e.g., recent three years) and representativeness (e.g., typical cases) to establish databases and observe adjudication consistency through network indicators. Second, use overall network indicators to test and optimize case classification. For instance, network density exceeding 0.3 can preliminarily determine whether similar cases can be further subdivided by cause of action and applicable law circumstances, providing methodological support for forming specific case adjudication guidelines.

IV. From "Isolation" to "Connection": Exploring Integrated Digital System Construction

As Marx Weber and Montesquieu's "vending machine" theory suggests, "Modern judges are vending machines—citizens insert complaints and fees, and out come judgments and reasons copied from codes." The intention is to uphold legislators' original intent and prevent judicial manipulation. As the malady of legal criterion chaos from non-unified legal systems becomes increasingly prominent, uniform legislation alone cannot ensure legal unity, as the same legal provisions and concepts can be interpreted differently. In this sense, China needs a "vending machine-style" intelligent trial system that abandons external interference. As long as case facts and dispute focal points are "input," the system can quickly "output" adjudication results and bases through analysis of statutory laws and precedents, thereby assisting judges.

Following the call to "establish digital courts," IBM's Advanced Case Management judicial assistance system and Nanjing Intermediate People's Court's "Alpha Judge" robot-assisted adjudication system have attempted AI-trial procedure integration. However, AI legal systems still face theoretical and practical misconceptions, failing to grasp their essence and treating digital court construction as a technical rather than legal problem. This reversed cognition is the fundamental reason why smart court construction struggles to reach high levels. Meanwhile, no matter how powerful a system's storage, search, computation, and learning functions, it may not necessarily become a qualified "robot judge." The key lies in what kind of human nature, humanitarian concepts, rule-of-law spirit, faith, and adjudication art of dispute resolution it possesses, whether in human brains or computers.

Addressing this status quo, this study aims to reconstruct intelligent trial systems around an "integrated digital system," using big data and AI to process judicial data, help judges think independently and retrieve quickly, achieve rapid handling of simple cases and more efficient judgment of major and complex cases.

Figure 7

Integrated Digital System Construction Pathway Diagram (Compiled by Author)

(I) Reconstructing the Case Classification System from "Separation" to "Connection"

The first step in integrated system construction involves organizing and categorizing existing massive data to facilitate subsequent retrieval analysis and network construction. The research focus of this first step is how to classify according to what criteria and how to improve work efficiency while ensuring accuracy.

First, pre-trial case classification for rapid case type identification. In traditional

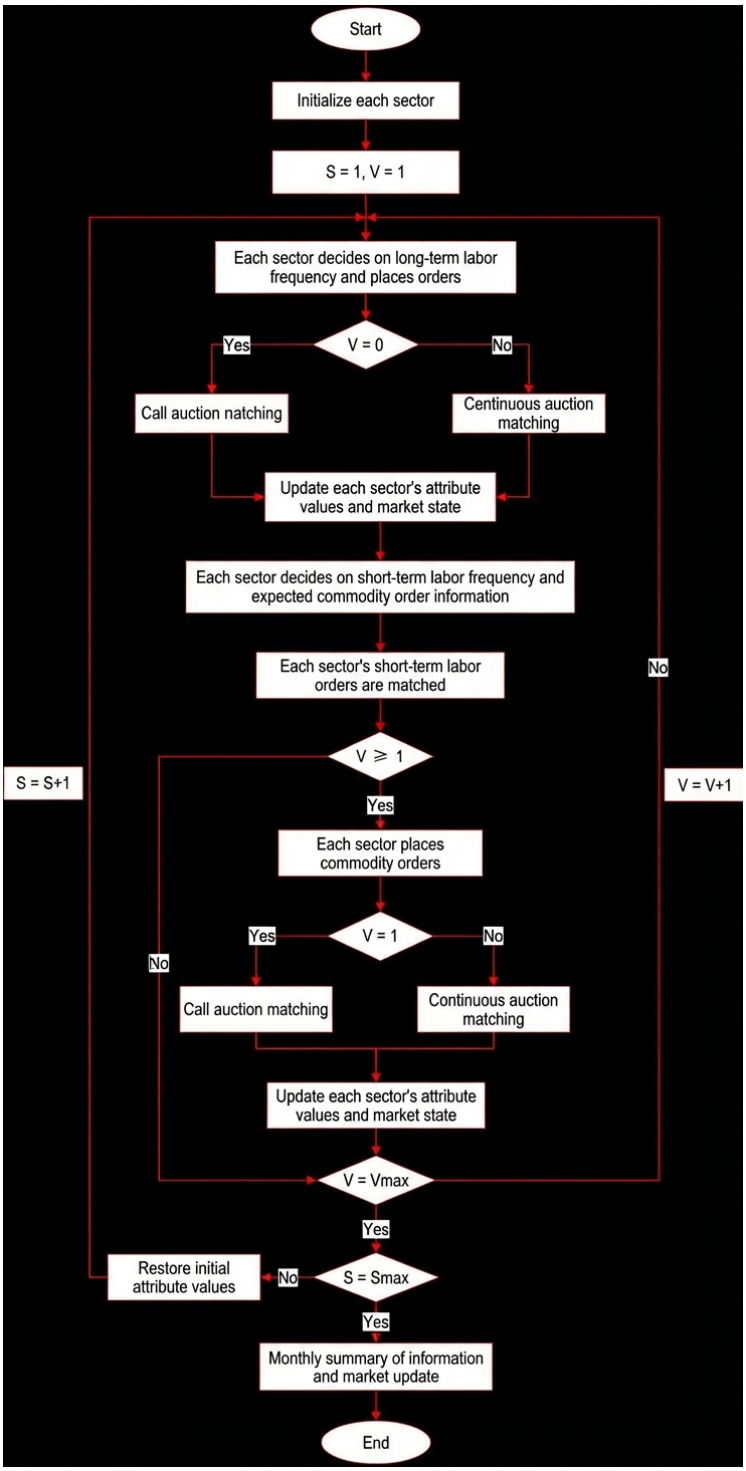

Figure 6: Figure 7

judicial case databases, case retrieval and case analysis are independent. During case assignment, judges must first search by cause of action, then analyze cases within that dispute type—a cumbersome procedure that reduces trial efficiency to some extent.

Based on the characteristic that credit card disputes can be organically combined with digital courts, this study selected personal information protection-related credit card contract disputes as a typified dispute type. First, it analyzed the rights relationships and dispute resolution pathways of this typified dispute, then used social network analysis tools to analyze and construct networks of cited laws and regulations for such disputes, thereby generating "cloud maps" of laws and regulations for this dispute type.

Figure 8

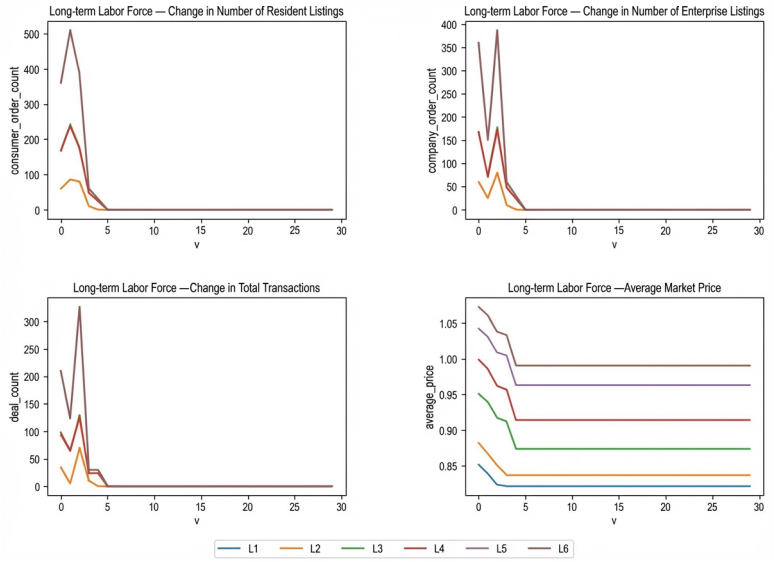

Figure 7: Figure 8

Word Cloud of Cited Laws and Regulations (Compiled by Author)

The significance of this discovery lies in the generalizability of this method—typifying cases and conducting categorized analysis of their characteristics and commonalities—to all cases in digital court construction. By using AI semantic understanding and training engines, massive judicial case databases can be searched by keywords to extract and categorize cases needed by judges and automatically generate "cloud maps" and other information for typified cases. This means judges only need to input case keywords, and the intelligent trial system will automatically identify case types and provide databases for that case type along with frequently encountered issues, significantly simplifying trial procedures, reducing judges' workload, and improving trial efficiency.

Second, classification during trial to help judges learn from experience. Current case databases mostly classify by cause of action, with cases under each category only sortable by external features like time, court level, and document type. However, in actual trial practice, judges can quickly classify cases by cause of action based on personal experience and need more refined classification case databases. Meanwhile, real-world AI cannot exist independently of human knowledge and practice but instead deeply depends on human existence. Current classification systems are mostly mechanized and "foolproof," determining categories solely by keyword appearance. For example, during this study's retrieval process, multiple cases were misclassified as personal information infringement simply because the judgment text mentioned "submitted personal information registration forms and other evidence."

During network construction for 49 cases of this typified dispute, this study discovered 1 case whose cited laws and regulations had no connection with other cases. Through case analysis and comparison, this case was excluded from discussion. This exclusion process currently can only be achieved manually, requiring judicial personnel to use social network analysis for classification and exclusion. However, if the process of judicial personnel's classification and exclusion is used to generate training data for AI systems, it may improve current classification systems and build more professional and precise databases incorporating judicial wisdom and experience.

Through constructing keyword retrieval-based case assignment systems and reconstructing precise classification systems, current classification systems' mechanization and superficiality issues can be resolved, improving trial efficiency throughout the entire process from case assignment to judgment.

(II) Building a Judicial Information Network from "Fragmentation" to "Connection"

After the first step of classification system reconstruction aggregates individual cases and completes preliminary screening and analysis of judicial data, the next step is building "bridges" within typified disputes and among various dispute types to construct an overall case network and thereby build a res judicata analysis model.

First, integration of the judicial information network. In judicial trials, every case contains an information chain. Viewing isolated information points on the chain makes it difficult to discover inter-case connections and characteristic problems of that case type. However, in traditional legal research, all studied cases exist as individual instances, forcing judges to analyze cases sequentially and independently without fully colliding and comparing each information point with big data. Case data lack intersection and connection, making it difficult to clearly reveal commonalities and individualities among numerous cases or to deeply mine and summarize experience patterns from increasing judgments.

Within typified disputes, this study establishes a judicial information data net-

work model using cited laws and regulations in judgments as logical threads, constructing multiple isolated judgment "samples" of this typified dispute into a clearly visualized information network. This enables one-click generation of each law and regulation's citation frequency and relationship strength, realizing interactive connections of res judicata. Specifically, in judicial practice, judges can use network models constructed from previous typified cases as references for applicable laws and regulations. Courts can analyze and compare adjudication situations of different judges for similar cases, testing whether judges have adjudication method preferences to avoid "different judgments for similar cases," safeguard res judicata, and strengthen case quality supervision. Meanwhile, courts can also test implementation and enforcement effects of relevant laws and regulations by generating networks for specific times and contexts. For example, this study found that provisions on temporal effect were frequently cited, revealing many cases filed before the *Civil Code*'s enactment but adjudicated after its effective date, involving disputes over applicable law.

Second, establishment of similar-case retrieval databases. Since China's Civil Procedure Law Code was formulated, it has achieved qualitative improvements, but some important content remains to be perfected or is even absent, including the judgment system. China's judgment system is too simplistic, lacking clear provisions on objective, subjective, and temporal boundaries of res judicata, relationships between res judicata and judgment main texts, etc., affecting legal unity and judicial credibility. Based on this status quo, to promote higher courts' role in unifying legal decisions for lower courts, coordination mechanisms for legal interpretation must be established to handle legally significant disputes.

This study aims to promote similar-case retrieval database construction through judicial information network establishment. Through precedents and Supreme People's Court judicial interpretations and guiding cases, a res judicata network is formed to constrain judges' adjudication. Once a final judgment is determined, parties cannot dispute the judgment, and courts cannot make contradictory decisions. Previous judgments exert mandatory binding force on subsequent trials. By constructing intelligent trial systems based on similar-case retrieval databases, traditional case-assignment models based on cause-of-action types are replaced, deep connections among cases are excavated, and judges' adjudication is further constrained to prevent erroneous "different judgments for similar cases," strengthening trial supervision and improving judicial credibility.

(III) From "Local" to "Global": Realizing Social Governance Functions

Constructing an integrated judicial information network during digital court construction integrates originally isolated and dispersed judgment documents into a unified and centralized social relationship network. Through this network, digital courts can realize the two core functions of "data-assisted adjudication" and "data-assisted supervision." Meanwhile, digital courts' "data-assisted governance" function requires effective connection between judicial data and social

governance, while current underutilization of judicial data also limits this function. Thus, this study explores judicial information network applications in the "data-assisted governance" function.

Currently, people's courts have accumulated massive judicial data but lack systematic utilization, leaving most judicial data in a static, fragmented, and passive "sleeping" state, making it difficult to achieve deeper-level visualized effective management. This makes it inconvenient for decision-makers and managers to grasp the overall situation and solve macro-level social problems. Judicial data networks can provide feasible solutions to this problem. Using this study as an example, constructing and analyzing the overall judicial data network yields parameters like "degree" and "betweenness," which can evaluate practical application and citation frequency of laws and regulations. If this model is extended to other typified disputes, usage frequency of laws and regulations in judicial practice can be estimated, thereby revealing social hotspot issues. These analysis results can guide future legislation and amendment work and provide references for judicial interpretation directions. Regrettably, this network currently only covers simple disputes with minor factual controversies and cannot cover all complex social problems, potentially constraining the guidance role of overall case networks in the "data-assisted governance" function.

In summary, promoting judicial data networks helps realize digital courts' "data-assisted governance" function. However, this function can currently only be realized in simple cases with minor factual controversies that have been typified. Therefore, future research must explore how to apply judicial data networks in complex cases to better serve digital court construction.

V. Research Significance

(I) Theoretical Significance

In the studied field of personal information protection-related credit card disputes, this paper analyzes rights and obligations relationships among parties in credit card service contracts by subject and intuitively constructs a rights relationship diagram. This diagram facilitates judges' analysis of case facts, grasp of dispute focal points, definition of dispute types, and completion of case typification. Subsequent application of social network analysis models can reference previous cases and associated legal provisions to improve trial efficiency. Moreover, this diagram establishes the legal relationship foundation for future model application and in-depth analysis.

This study's main contribution lies in innovatively applying quantitative analysis tools and social network analysis to digital courts, theoretically proving the feasibility of applying judicial data networks and similar-case retrieval databases to digital court construction. It also analyzes the advantages and limitations of this method in addressing current digital court challenges and proposes next-step optimization directions.

(II) Practical Significance

By constructing judicial data networks to form similar-case retrieval databases, this study aims to address current digital court challenges: insufficient depth in judicial data mining, lack of effective trial quality inspection systems, and imperfect traditional case-assignment systems. The social network model solves the problem of insufficient judicial data mining depth by linking similar-case judgments to construct a judicial data network. The resulting similar-case retrieval database helps judges quickly locate relevant legal provisions, achieve "same judgment for similar cases," and provide effective tools for trial quality inspection. If applied broadly, the big data provided by this model will help guide solutions to macro social problems, strengthen social governance, and realize digital courts' "data-assisted governance" function.

VI. Conclusion and Outlook

This study focuses on the dispute type of "credit card contract disputes related to personal information protection," comprehensively screening representative and timely judgment documents from Beijing 2022-2024 to establish a legal citation database. Using social network analysis to draw legal citation network diagrams, calculating relevant individual and overall indicators, analyzing model findings, and aligning with digital court research directions, this paper emphasizes analyzing social network analysis application pathways in integrated digital court system construction. It concludes that serving the comprehensive trial process through three steps—case clustering, network connection, and application promotion—helps build digital courts: First, facilitating dispute case typification by connecting case retrieval and analysis to optimize data screening; second, building integrated case networks to help reference applicable laws and regulations while conducting case quality supervision; third, promoting integrated systems in social governance by developing diverse keyword networks to deeply explore legal problem causes and assist legislation and amendment.

However, this study has many limitations and areas for improvement: First, using only Beijing cases from 2022 to September 2024, the conclusions require further verification in other regions, necessitating future analysis of nationwide similar dispute case trial practices. Second, due to limited cases in the People's Courts Case Database and China Judgments Online, plus insufficient search engine intelligence and efficiency, this study only used PKULaw as the case database. Therefore, the official nature of case sources is somewhat lacking, with possible incomplete coverage of all Beijing credit card personal information protection cases from 2022-2024, requiring further case retrieval and investigation. Third, focusing mainly on applicable laws and regulations and their correlations, this study did not analyze other keyword networks (e.g., cause of action) constructible through social network analysis due to length limitations, leaving room for future multi-dimensional keyword network model construction exploration.

Currently, the social network analysis method studied remains in the exploratory stage of application possibilities in digital court intelligent trial systems, establishing different keyword and case data networks to explore legal application precision and serve adjudication. In mid-term application, it can be further promoted to larger-scale case network construction, achieving connections across time and geography to help judges analyze cases and summarize experience from multiple horizontal and vertical perspectives, ultimately realizing the construction of a complete judicial information integrated system.

Figures

Network Density	0.301
Number of Edges	92
Number of Nodes	18

Figure 8: Figure 9

Cronbach Reliability Analysis			
Name	Corrected Item-Total Correlation (CITC)	Cronbach's α if Item Deleted	Cronbach's α Coefficient
Column 1	0.758	-	0.586
Column 2	0.758	-	
Note: Standardized Cronbach's α Coefficient = 0.863			

Figure 9: Figure 10

Regulation Name	Date of Release	Relevant Content
Supreme People's Court "Several Provisions on the Application of the Temporal Effect of the <Civil Code of the People's Republic of China>" Article 1	2020-12-29	General provisions on the **temporal effect of the application of the Civil Code**
"Civil Code of the People's Republic of China" Article 1032	2021-01-01	Provisions concerning the **right to privacy and privacy**
"Contract Law of the People's Republic of China" Article 60 (Now changed to "Civil Code of the People's Republic of China" Contract Part Article 509)	1999-10-01	Strict and comprehensive performance of obligations and the **principle of good faith**
"Civil Code of the People's Republic of China" Article 496	2021-01-01	Provisions concerning **standard terms**
"Civil Code of the People's Republic of China" Article 6	2021-01-01	**Principle of fairness**
"Civil Code of the People's Republic of China" Article 1034	2021-01-01	**Personal information is protected by law**
"Contract Law of the People's Republic of China" Article 107 (Now changed to "Civil Code of the People's Republic of China" Liability for Breach of Contract Part Article 577)	1999-10-01	Provisions concerning **liability for breach of contract**
"Civil Code of the People's Republic of China" Article 497	2021-01-01	**Circumstances where standard terms are invalid**
"Contract Law of the People's Republic of China" Article 8 (Now changed to "Civil Code of the People's Republic of China" Contract Part Article 465)	1999-10-01	Principle of performing obligations according to the contract
"Civil Code of the People's Republic of China" Article 1035	2021-01-01	**Handling of personal information** shall follow the principles of legality, legitimacy, and necessity
"Security Law of the People's Republic of China" Article 18 (Now changed to "Civil Code of the People's Republic of China" Contract Part Article 688)	1995-10-01	**Joint and several liability guarantee**
"Provisions of the Supreme People's Court on Several Issues Concerning the Trial of Civil Dispute Cases Involving Bank Cards" Article 2	2018-06-06	Validity of credit card contract terms and adjustment principles

Figure 10: Figure 11

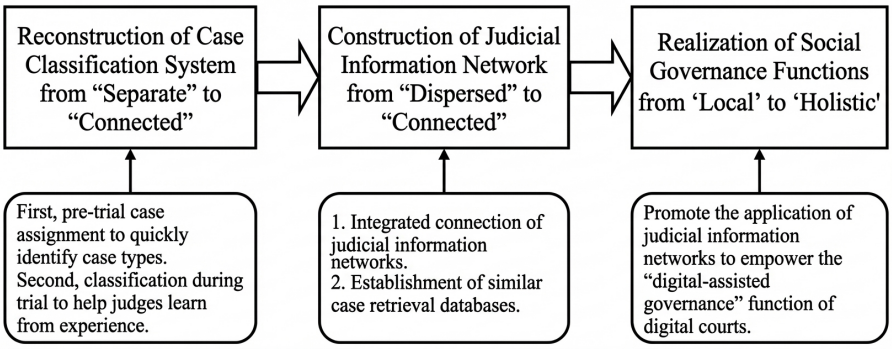

Figure 11: Figure 13