International Journal of Advanced Engineering and Technology
ISSN: 2456-7655; Impact Factor: RJIF 5.54
Received: 03-01-2019; Accepted: 04-02-2019
www.newengineeringjournal.com
Volume 3; Issue 2; April 2019; Page No. 09-14

A context-awareness cluster analysis of legal texts based on quantum mechanism

Lina Zhang[1], Rui Wang[2], Yinglu Chen[3], Ziyi Zuo[4], Zhengying Cai[5*]
[1] School of Law and Public Administration, China Three Gorges University, Yichang, China
[2, 4, 5] College of Computer and Information Technology, China Three Gorges University, Yichang, China
[3] Medical College, China Three Gorges University, Yichang, China

Abstract
Based on the key points of quantum mechanics, the syntax, transitional semantics and open-mutual simulation of a context-awareness cluster analysis (CACA) are described in detail. Thus it gradually describes how the legal text analyzes the contextual awareness of different cases according to different grammars. The symbolic operation semantics of CACA is proposed, which mainly describes the process of manipulating quantum under the condition that a specific quantum state is required. Therefore, a symbolic double simulation between quantum processes is proposed, and then quantum clustering analysis of legal texts is carried out. Meanwhile, a symbolic double simulation algorithm for quantum clustering analysis of context awareness in legal texts is proposed. This algorithm takes into account the complexity of symbols, variables and time in context-aware clustering analysis of legal texts to ensure the accuracy and correctness of simulation analysis. Finally, the correctness of symbolic mutual simulation in quantum clustering analysis of context awareness in legal texts is further verified.

Keywords: text analysis, cluster analysis, context-awareness, quantum mechanism

1. Introduction

Text analyzing is an unsolved problem because of its context-awareness characteristics, and recently many researchers involved in this area. Bhasuran (2018) [1] employed a text mining and network analysis to find functional associations of genes in high altitude diseases, and Huang (2009) [5, 2] analyzed the systematic and integrative of large gene lists using DAVID bioinformatics resources. Many researchers also noticed the system view in text analyzing. Polanczyk (2007) [3] described the worldwide prevalence of ADHD with a systematic review and meta regression analysis, and Gefen (2018) [4] considered that text analysis can reveal patterns of association among medical terms and medical codes. Furthermore, Huang (2009) [5, 2] made a research on systematic and integrative analysis of large gene lists using DAVID bioinformatics resources.

Effective clustering analyzing will help us in context-awareness text solving. Besides (2010) pointed out that search and clustering orders of magnitude faster than BLAST, and Matthews (2018) [7] considered improved interpretation of mercury intrusion and soil water retention percolation characteristics by inverse modelling and void cluster analysis. Improving cluster analysis can differentiate conflicted factors in context-awareness environment. He (2016) [8] talked about the study on cluster analysis used with laser-induced breakdown spectroscopy, and Caesar (2018) made a research on hierarchical cluster analysis of technical replicates to identify interferents in untargeted mass spectrometry metabolomics.

In complex information management system, context-awareness analysis problem gained more and more attention. Maran (2018) [10] illustrated the domain content querying using ontology-based context-awareness in information systems, and Zhang (2013) [11] talked about a survey on context-awareness in ubiquitous media. Moreover, Gasparetti (2017) [12] presented the personalization and context-awareness in social local search with state-of-the-art and future research challenges.

Recently, quantum clustering was proposed to solve the difficulty in clustering problem. Xue (2018) [13] researched novel carbon quantum dots for fluorescent detection of phenol and insights into the mechanism, and Li (2018) [14] made a model for determining ideal strength and failure mechanism of thermoelectric CuInTe2 through quantum mechanics. Quantum mechanism was verified to be effective in solving uncertain analyzing. Dai (2014) [15] introduced single sign-on under quantum cryptography. Wu (2011) [16] said that quantum mechanism helps agents combat "bad" social choice rules.

This paper proposed a context-awareness cluster analysis of legal texts based on quantum mechanism. The structure of the article is as follows. In Section 2, a legal text analysis model is proposed where its characteristics and quantum transformation are analyzed. In Section 3, a context-awareness analysis is presented to describe context-awareness model in quantum mechanism and quantum clustering for text analysis. In Section 4, the method is applied to an example analysis and some discussions are made to verify the proposed model. The paper is concluded with a summary and discussion in Section 5.

2. Legal Text Analysis

2.1. Characteristics of legal text analysis

The analysis of legal texts requires different scenarios for different cases. Each scene is different, such as homicide, fraud, kidnapping, and so on. All cases are clustered, even after all cases are subdivided into many clusters. Different clustering results in different scenarios, which requires different contextual grammars for case analysis. It is assumed that $cVar$ and $qVar$ are both infinite and a set Exp of classical data expressions over Real, which includes $cVar$ as a subset and is ranged over by μ, μ',..., and a set of Boolean-valued expressions $BExp$, ranged over by ∂, ∂',…,with the usual set of Boolean operators $\iota, \chi\chi, \neg, \wedge, \vee$ and $\rightarrow . cVar$, ranged over by α, δ,...,like to be the set of classical variables; $qVar$, ranged over by κ, β,…like to be the set of quantum variables. It is assumed that only classical variables can occur free in both data expressions and Boolean expressions. Particularly, $\mu \rhd\lhd \mu'$ be a Boolean expression for any $\mu, \mu' \in$ Exp and $\rhd\lhd \in \{>, <, \geq, \leq, =\}$.

Assuming that the set of classical channel names is defined as $cText$, it is covered by o, v,… The set of quantum channel names is defined as $qText$, which is covered by o, v,… Let's set $Text = cText \cup qText$. χ is a one to one re markup function from $Text$ to $Text$, making $\chi(qText) \subseteq qText$ and $\chi(cText) \subseteq cText$, where i is the silent action, $Y(\tilde{\alpha}, \tilde{\kappa})$ is a process constant, χ is a relating function, $L \in Text$, $\partial \in$ BExp, and t and ω are respectively a trace-preserving quantum operator and a nondegenerate projective measurement applying on the Hilbert space accompanied by the systems $\tilde{\kappa}$.

It is assumed that total quantum operators are completely positive. According to these mark, the syntax of CACA terms can be gotten by the Backus-Naur form as $\iota ::= nil|Y(\tilde{\mu}, \tilde{\kappa})|\wp.\iota|\iota + \iota|\iota||\iota|\iota\backslash L|\iota[\chi]|$ if $b$then ι, $\wp ::= i|o?\alpha|o!\mu|o?\kappa|o!\kappa|t[\tilde{\kappa}]|\omega[\tilde{\kappa};\alpha]$, where $\alpha \in cVar, c \in qText$, $o \in cText$, $\kappa \in qVar$,$\tilde{\kappa} \subseteq qVar$, $\mu \in$ Exp, $\tilde{\mu} \subseteq$ Exp. If $\kappa_1, \ldots, \kappa_n$ are distinct quantum variables and the dimension n is understood, the $\kappa_1, \ldots, \kappa_n$ will be abbreviate the indexed set to $\tilde{\kappa}$, besides, using $\tilde{\kappa}$ to denote the string $\kappa_1, \ldots, \kappa_n$. A serious of process constant schemes, ranged over by many factors.According to each process constant scheme, as two nonnegative integers: $ar_o(Y)$ and $ar_\kappa(Y)$. If $\tilde{\alpha}$ is a classical variable tuple of $|\tilde{\alpha}| = ar_o(Y)$ and $\tilde{\kappa}$ is a different quantum variable tuple of $|\tilde{\kappa}| = ar_\kappa(Y)$, then $Y(\tilde{\alpha}, \tilde{\kappa})$ is defined as a process constant. When $ar_o(Y) = ar_\kappa(Y) = 0$, Y is often used to represent process constants.

For example, legal text analysis is devoted to showing rigorously that the two ways of setting a quantum system to the pure state$|0\rangle$. Let $Y = \{(|\gamma, \int_\theta|), (|\rho, \int_\theta|)\}$, $\hbar = \{(|\int [\kappa].nil, Set_\kappa^0|), (|\rho_0, Set_\kappa^0|), (|\rho_1, Set_\kappa^1|)\}$, and D' be the equivalence relation generated by$\{Y, \hbar\}$.

2.2. Quantum transformation

For $\wp$, $o\eta(\wp)$ is represented as the channel name set that it uses, then there is $o\eta(o?\beta) = o\eta(o!\beta) = \{o\}$,$o\eta(i) = \emptyset$ and $o\eta(o?m) = o\eta(o!m) = \{o\}$. At the same time, the relay function has been widely extended to Act_o. For any $\wp \in Act_o$, If $\wp$ does not represent quantum input, the bound quantum Variable $\kappa\,\partial m(\wp)$ of $\wp$ is defined as $\kappa\,\partial m(\wp) = \emptyset$ and $\kappa\,\partial m(o?\beta) = \{\beta\}$. The state space of the q-system is two-dimensional Hilbert space θ_κ, then the prerequisite is all quantum variables $D \in qVar$. $\theta_D = \bigotimes_{\kappa \in D} \theta_\kappa$ can be deduced for all. Particularly, the state space of the entire environment composed of total quantum variables is $\theta = \theta_{qVar}$.

And through the system (p$Text$) $\langle Con, Act_o, \mapsto \rangle$, a probabilistic marking transformation system, the operational semantics of CACA is worked out. *Dist*($Text$) is a set, it is representative of the $Text$ collection of the probability distribution of all finite support and covered by c, m … It should be noted that s should be interpreted as a density operator on a finite dimensional subspace containing θ of $\theta_{\kappa m(\gamma)}$, because θ is endless dimensional. To make the $Act_o = \{i\} \cup \{o?m, o!m | o \in cText, m \in Re\,a\,l\} \cup \{o?\beta, o!\beta | o \in qText, \beta \in qVar\}$, it is assumed that the O, v as the unit of a series of $Text$ sets. This is transitional semantics, which requires a closed quantum process to be defined as γ as a hypothesis. The form $\langle \gamma, s \rangle$ is called a set of configurations, which density operator on θ is $s \in v(\theta)$.

The minimum relation of the inference rules described is satisfied by $\mapsto \subseteq Text \times Act_o \times Dist(cText)$. At the same time, the significant extension of function $||$ in distribution will also be widely used. In a word, if $c = \sum_{\ell = \int} \vartheta_\ell \langle \gamma_\ell, s_\ell \rangle$, then the distribution of $c = \sum_{\ell \in \int} \vartheta_\ell \langle \gamma_\ell || \rho, s_\ell \rangle$ was represented by $c||\rho$. In order to regulate Sum_o,$O - Com_o$,Par_o, $\rho - Com_o$ of the symmetric form could be omitted. In these codices, $O \overset{\wp}{\mapsto} v$ is obtained by misusing symbols. In $O \overset{\wp}{\mapsto} c$, c is simply distributed and $c(v) = 1$. Similarly, extended mode similar to this is also used in $c\backslash L$ and $c[\chi]$. The operators $\backslash L$ and $[\chi]$ model restriction and erlabelling, such as: $\iota\backslash L$ looks like ι as long as all the action through the channels in L is prohibitted, and $\iota[\chi]$ looks like ι where all the channel names are replaced by its image under the relabelling function χ.

So it is necessary to show that $(|Sdc_{spec}, \int_\theta|) \approx (|Sdc, \int_\theta|)$. Indeed, let $Y = \{(|Sdc_{spec}, \int_\theta|), (|Sdc, \int_\theta|)\}$, $\hbar^\delta = \{((|\iota, t|): v(|\iota, t|)) = \delta\}$, $O_\ell^\varepsilon = \{(|\iota, t|): (|\iota, t|)$ along the branch of $\alpha = \ell$,and $v((|\iota, t|)) = \varepsilon\}$.

3. Context-Awareness Analysis

3.1. Context-awareness model in quantum mechanism

To get rid of quantum processes which are not physically available require $\kappa \notin \kappa m(\iota)$in $o!\kappa.\iota$and $\kappa m(\iota) \cap \kappa m(\pi) = \emptyset$ in $\iota||\pi$, where for a process term ι, $\kappa m(\iota)$ is the text set. The symbolic operation semantics of CACA is proposed, which mainly describes the process of manipulating quantum under the condition that a specific quantum state is required. Assumed that for each process constant $Y(\tilde{\alpha}, \tilde{\kappa})$, there is a defining equation $Y(\tilde{\alpha}, \tilde{\kappa}) \overset{\text{def}}{=} \iota$ to describe the notion of CACA syntax.

Therefore, a symbolic double simulation between quantum processes is proposed, and then quantum clustering analysis of legal texts is carried out. If $\chi m(\iota) = \emptyset$, A quantum process term ι will be inoperative. Notion of classical variables in quantum processes, described by$\chi m(\cdot)$, can be described in a different way with the unmatched modification, which the quantum measurement prefix $\omega[\tilde{\kappa};\alpha]$ constrainted $\alpha.\gamma$, consistanted by γ, ρ,...,the set of closed terms and T, wholly consistanted by ι, π,…, be the member of all CACA terms.

In some ways, its process constructs defined by us are similar with those in classical CACA. It is concluded that process terms are identified up to a-conversion, $\chi m(\iota) \subseteq \tilde{\alpha}$ and $\kappa m(\gamma) \subseteq \tilde{\kappa}$. Its intuitive meanings: nil is the representative of a process that does not perform all actions; $o?\alpha$ and $o!e$ are respectively classical input and classical output, besides, $o?\kappa$ and $o!\kappa$ are their quantum counterparts. $t[\tilde{\kappa}]$ means the performance of the quantum operator t on the qubits $\tilde{\kappa}$ while $\omega[\tilde{\kappa};\alpha]$ measures the qubits $\tilde{\kappa}$ based on ω and the calculation outcome is take the place of the classical variable α.+ models nondeterministic choice: $\iota + \pi$,the same as ι and πrely on how the environment choose. $||$ means the usual parallel composition.

Finally, if ∂ then ι is the Selection of standard conditions where ι can be implemented only if ∂ is ι. ψ is used to

describe these extensions. $\psi\{m/\alpha\}$ evaluation that different from ψ in the maps of α to m. ψ is evaluated and found it is a function from $cVar$ to Real, which is able to extend in an obvious way to functions from Exp to Real and from $BExp$ to $\{\iota, \chi\chi\}$, and finally, from T to γ.
An equivalence relation D is produced by $\tilde{Y}$ if its equivalence classes on the set of snapshots $\cup_{\ell\in\int} Y_\ell$ are concluded by the partition $\tilde{Y}$ and it is the identity relation on $DG - \cup_{\ell\in\int} Y_\ell$. Let $\tilde{Y} = \{Y_\ell : \ell \in \int\}$ be a set of disjoint subsets of snapshots. Peope want to know if it is enough only by requiring $ƛD^{\partial'}\aleph$ at the end of clustering, and make a conclusion from it $(gt \bullet ƛ)D^{\partial'}(g\Re \bullet \aleph)$ if necessary. $(|\iota, t|)$and $(|\pi, \Re|)$were given, then$(|\iota, t|) \sim_g^{\partial} (|\pi, \Re|)$ were written if there is a context-awareness model $\{D^\partial, \partial \in BExp\}$ with $(|\iota, t|)D^\partial(|\pi, \Re|)$.
A connection D with DGwill be closed under quantum operator application if $(|\iota, t|)D(|\pi, \Re|)$ implies $(|\iota, gt|)D(|\pi, g\Re|)$ for all $g \in D_\iota\left(\theta\frac{}{\kappa m(\iota)}\right)$. A gather of relations will be closed under quantum operator application while each individual relation is.

3.2. Quantum clustering for text analysis

It is extremely significative to separate the quantum operator application and transitions in the notion of symbolic text cluster analysis when proving bisimilarity. From above,$H = \{D^\partial, \partial \in BExp\}$ are equivalent to DG. $H$is named a symbolic text cluster analysis for all $\partial \in BExp$, $(|\iota, t|)D^\partial(|\pi, f|)$ implies that $\kappa m(\iota) = \kappa m(\pi)$ and $t \tilde{\frac{}{\kappa m(\iota)}} \Re$, if ∂ is realizable; for all $g \in D_\iota\left(\theta\frac{}{\kappa m(\iota)}\right)$, whenever $(|\iota, gt|) \overset{\partial_1, y}{\rightarrow} ƛ$ with $\partial m(\gamma) \cap \chi m(\partial, \iota, \pi) = \emptyset$, there exists a collection of Booleans $\hbar$ such that $\partial \wedge \partial_1 \rightarrow \vee\, \hbar$ and $\forall \partial' \in \hbar, \exists\, \partial_2, y'$ with $\partial' \rightarrow \partial_2, y, (|\pi, g\Re|) \overset{\partial_2, y'}{\rightarrow} \aleph$ and $(gt \bullet ƛ)D^{\partial'}(g\Re \bullet \aleph)$.
The notion of open text cluster analysis has been described in detail. In order to study the mutual simulation relationship of clustering analysis of context awareness in legal texts more effectively, the mutual simulation of relevant symbols in legal texts is discussed in the following discussion. Suppose there is equivalence relation : $D = DG \times DG$,
D was applied to $Dist_\theta(DG) \times Dist_\theta(DG)$ through defining $ƛD\aleph$ if for all equivalence type $\Im = DG/D, ƛ(\Im) \tilde{=} \aleph(\Im)$; In other words, $\sum_{\iota\in\Im} ƛ(\iota) \tilde{=} \sum_{\iota\in\Im} \aleph(\iota)$. $y =_\partial y$ was written if either $y = o!\mu$, $y = o!\mu'$, and $\partial \rightarrow \mu = \mu'$, or $y = y'$ if both of them are not classical outputs.
Two quantum process terms ι and π are symbolically bisimilar, noticed by $\iota \sim^\partial \pi$, if $\left(|\iota, \int_\theta|\right) \sim^\partial \left(|\pi, \int_\theta|\right)$. When $\partial = \iota$, being written $\iota \sim \pi$ here. A family of equivalence relations $\{D^\partial, \partial \in BExp\}$ is called a context-awareness model if for any $\partial \in BExp$, $(|\iota, t|)D^\partial(|\pi, F|)$ implies that $\kappa m(\iota) = \kappa m(\pi)$and $t \tilde{\frac{}{\kappa m(\iota)}} \Re$, if b is satisfiable, whenever $(|\iota, t|) \overset{\partial_1, y}{\rightarrow} ƛ$ with $\partial m(y) \cap \chi m(\partial, \iota, \pi) = \emptyset$. Let D_1^{ι} be the equivalence relation generated by $\{Y, \hbar^1, \hbar^2, \hbar^3, \hbar^4\}$, and $D_1^{\alpha=\ell}$ generated by $\{O_\ell^\varepsilon : 5 \le \varepsilon \le 10\}$. where $\nu\big((|\iota, t|)\big)$ is the depth of the node $(|\iota, t|)$ from the root of its corresponding qText. For any $\partial \in BExp$, let D^∂ be $D_1^{\alpha=\ell}$ if $\partial \rightarrow \alpha = \ell$, D_1^{tt} if $\partial \rightarrow \iota$, and the identity relation otherwise.

The aggregation,$\{D^\partial, \partial \in BExp\}$ where $D^\partial = D'$ for all $\partial \in BExp$, is a context-awareness model. There has a collection of Booleans $\hbar$ such that $\partial \wedge \partial_1 \rightarrow \vee\, \hbar$, $\forall \partial' \in \hbar, \exists\, \partial_2, y', \partial' \rightarrow \partial_2, y =_{\partial'} y'$, $(|\pi, \Re|) \overset{\partial_2, y'}{\rightarrow} \aleph$, and $(t \bullet ƛ)D^{\partial'}(\Re \bullet \aleph)$. A family of equivalence relations $\{D^\partial, \partial \in BExp\}$ is a symbolic text cluster analysis only if it is both a ground text cluster analysis and closed under quantum operator application. gt and gF are both trace-preserving quantum operators, $ƛD^{\partial'}\aleph$ does not necessarily imply $(gt \bullet ƛ)S^{\partial'}(gF \bullet \aleph)$.
Name instantiation is playing the similar role as quantum operator application here. The above statement provides an incremental method of proving bisimilarity, this method analogous to a proof technique of open text cluster analysis for the n-calculus. For instance, if $ƛ = Y \bullet \iota$ and $\aleph = Y \bullet \pi$ with $\iota D^{\partial'}\pi$,and then $ƛD^{\partial'}\aleph$. $gt \bullet ƛ = Ygt \bullet \iota$ and $g\Re \bullet \aleph = Yg\Re \bullet \pi$ are not necessarily related by $D^{\partial'}$. Then it is simple to check that $H = \{D^\partial, \partial \in BExp\}$ is a context-awareness model. Again, as $Sdc_{spec}$and Sdc are both free of quantum input. Finally, $\left(|Sdc_{spec}, \int_\theta|\right) \sim \left(|Sdc, \int_\theta|\right)$.
Moreover, $Ygt \not\sim Yg\Re$. $(|\iota, t|)$ and $(|\pi, \Re|)$are symbolically bisimilar, expressed by $(|\iota, t|) \sim^\partial (|\pi, \Re|)$. if there consists a symbolic text cluster analysis $H = \{D^\partial, \partial \in BExp\}$ like $(|\iota, t|)D^\partial(|\pi, \Re|)$. Thus $\gamma \sim_\sigma \rho$. Besides, both γ and σ are free of quantum input, there is $\gamma \sim \sigma$. For example, it is aimed to proving rigorously that the protocol presented indeed sends several bits of classical information by transmitting a qubit.

4. Example Analysis

4.1. Example description

From above, it is necessary to compare their behaviours under any quantum operators for the purpose of checking whether two snapshots are symbolically bisimilar. But it is always infeasible since all quantum operators constitute a continuum, and it seems hopeless to design an algorithm that works for the most common case. For instance, the quantum teleportation protocol can be defined as follows Alice = $o?\kappa.\, \mathrm{OG}[\kappa, \kappa 1].\, \theta[\kappa].\, \omega[\kappa, \kappa 1; \alpha].\, \mu!\alpha.\mathrm{nil}$, Bob= $\mu?\alpha.\, \sum_{0\le\ell\le3}\left(\text{if } \alpha = \ell \text{ then } \sigma^\ell[\kappa 2].\, \nu!\kappa 2.\mathrm{nil}\right)$, Tel= (Alice||Bob)\ $\{\mu\}$. When $\kappa 1$ and $\kappa 2$ are initially correlated as a maximally entangled state, to the ideal specification $o?\kappa.\, D\Xi_{1,3}[\kappa, \kappa 1, \kappa 2].\mathrm{d}!\kappa 2.\mathrm{nil}$, where $D\Xi_{1,3}$ is a multi qubit unitary operator that exchanges the states of the first and the third qubits, keeping the second qubit untouched. Its soundness is guaranteed by the fact that Tel is bisimilar.
Because the circumstances of each case are different, a large number of symbols are needed to cluster their contextual awareness. In this process, there will inevitably be some problems, resulting in analysis errors. In order to ensure the correctness of clustering analysis of context awareness in legal texts, a method must be found to test the correctness of symbolic mutual simulation. Deleting $o?\kappa$ from Alice and d!$\kappa 2$ from Bob to make the teleportation protocol free of quantum input. Describe by Tel′ the resulting protocol. It is surely to show the soundness of Tel it suffices to prove that Tel′ is bisimilar to $D\Xi_{1,3}[\kappa, \kappa 1, \kappa 2]$.nil when a maximally entangled state is present. This ensures the correctness of context used in cluster analysis of legal texts.
A free snapshot is a symbolic double integral when two quantum inputs are used, and only if they are symbolic ground double integrals. This phenomenon is applicable to any non-recursive process, although the quantum input does

not occur at the beginning, but in the execution process. Therefore, the accuracy of context-aware quantum clustering analysis in each case and each branch of Anjiang can be verified by this algorithm. Worthy of attention, such as superdense coding, teleportation, quantum key-distribution protocols, etc, many existing quantum communication protocols such as superdense coding, teleportation, quantum key-distribution protocols can easily be modified to be, free of quantum input. It is important that a quantum input by a free quantum variable, both in the implementation and in the specification for the purpose of analysis we can safely replace a quantum input by a free quantum variable.

The most common Boolean ∂ is computed based on the finite branch transition graph and two given snapshots π and ι in the finite state, making $\iota\sim_{\sigma}^{\partial}\pi$. Through the most common Boolean $mgb(\iota,\pi)$, meaning $\iota\sim_{\sigma}^{mgb(\iota,\pi)}\pi$, and whenever $\iota\sim_{\sigma}^{\partial}\pi$, then $\partial\rightarrow mgb(\iota,\pi)$. This algorithm has verified the correctness of clustering analysis of a large number of contextual awareness of legal texts. B$isim(\iota,\pi)$ is called the primary procedure. To find the minimal symbolic double analog relationship that contains the pair, the program's initial snapshot pair (ι,π) is first found, and then compares the transformation of each pair of snapshots it arrives at.

The main clustering process has four most important parameters: π and ι are currently being checked terms; ∂ represents Boolean expressions that previously used cumulative constraints; Ξ is a set of snapshots for which the snapshot pair has been accessed. For each enabled by π and ι may be action, action for matching process from a comparison of π and ι may be mobile. A Boolean and a table are returned in each comparison; $mgb(\iota,\pi)$ is a Boolean result, and the double impersonation is represented by this table. A pair of snapshots are mapped to Boolean functions by this table as disjoint union of tables of the set, represented by $\neg$.

The comparison of τ conversion is the most significant difference between the algorithms. Next is introduced by using relational ζ to describe the distribution of program to approximate $\sim_{\sigma}^{\partial}$. For the two snapshots $\pi_{\delta}\in\lceil\nabla\rceil$ and $\iota_{\ell}\in\lceil\lambda\rceil$ below, if $\partial\rightarrow\Im(\iota_{\ell},\pi_{\delta})$, they are associated with ζ. To be more exact, the equivalent closure of ζ is used to replace it, so that it can be used in process checking. In addition, if the snapshot pair (ι,π) has been previously accessed, i.e. $(\iota,\pi)\in\Xi$, then assume that $\Im(\iota,\pi)$ displays u in all future visits. Therefore, generally speaking, ζ is thicker than $\sim_{\sigma}^{\partial}$.

When the new snapshot pair is found, use the clustering procedure and put the pair in the collection Ξ. Since the finite state transition graph is the main consideration, the number of pairs with differences is not infinite. Finally, each possible pair is contained in Ξ, and each matched call is terminated immediately. By checking λ,∇,ζ to calculate the constraints associated with it, the super operator value distribution λ is sublimated from ζ to ∇. The accuracy of the algorithm will be fully analyzed.

Therefore, o^2 is the number of comparisons that restrict the conversion of each snapshot pair. By comparing the two transformations, the function is used once, and the function can also be used. Next, the time complexity of the algorithm will be considered. Assume that the number η is the node in the transition graph that can be reachable from π and ι. The η^2 defines a snapshot of the algorithm on the number of inspection. All transitions about ι are compared with all transitions of π marked by the same action as it, when the snapshot pair (ι,π) is tested. Assume that each snapshot is exported to o at most, because the transition graph is a finite branch. In short, the algorithm considers the symbolic complexity, variable factor complexity and time complexity of context-aware clustering analysis of legal texts to ensure the accuracy and correctness of simulation analysis.

The consequence is that the complexity of the algorithms increases, and in the process it is essential to study how to reduce this additionality by developing effective techniques for quantum operators and developing better data structures to compare and manipulate them. Quantum operations, such as elementary operations, need to be checked for $t\tilde{\sim}_{\Phi}\Re$. Therefore, check the time required for each snapshot to $U(o^2n^3/\log n)$. Finally, it is calculated that the time complexity of executing clustering (ι,π) is $U(n^5/\log n)$ in the worst case. The complexity is analyzed by assuming the actual computing power. In order to implement the algorithm and approximate the super operator, the algebra or rational number matrix is used.

4.2. Discussions

In the following discussion, a CACA is proposed to describe the distribution and behavior of quantum snapshots in quantum clustering analysis of legal texts. Suppose ψ is taken as a criterion, then in any case, when and only when $\psi\in L$, $\psi,\iota\models\Gamma$ there will be $\iota=_{L}^{\psi}\pi$. In like manner, if for any $\Theta\in L$, there will be $\lambda=_{L}^{\psi}\aleph$, $\psi,\lambda\models\Theta$ when and only when $\psi,\aleph\models\Theta$. The L class of Act_D quantum clustering represented by Γ, Θ, etc, is defined by the following syntax:

$$\Gamma::=g_{\tilde{\kappa}}\left|\neg\Gamma\right|\bigwedge_{\ell\in\int}\Gamma_{\ell}|g.\Gamma|\langle y\rangle\Theta,\qquad \Theta::=\rho\underset{\sim}{>}_{Y}\left(\Gamma\left|\bigwedge_{\ell\in\int}\Theta_{\ell}\right.\right),$$

where $g\in D_{\iota}(\theta), Y\in D(\theta)$ and $y\in Act_D$. Here, Θ is commonly referred to as the distribution function and Γ is generally referred to as the snapshot.

If a factor satisfies the relation $\models\subseteq KV\times(DG\cup Dist_{\theta}(DG))\times L$, then the factor is defined as the minimum relation satisfying the following conditions. Because the state of operator $\neg$ is negated, the proof is very simple.

Case 0: if $\psi,\iota\neq\Gamma$, then $\psi,\iota\models\neg\Gamma$;

Case 1: if $\psi,\iota=\Gamma_{\ell}$for any $\ell\in\int$, then $\psi,\iota\models\Lambda_{\ell\in\int}\Gamma_{\ell}$;

Case 2: if $\sum_{\iota\in\lceil\lambda\rceil}\{\lambda(\iota):\psi,\iota\models\Gamma\}\geq Y$, then $\psi,\Delta\models\rho\underset{\sim A}{>}(\Gamma)$;

Case 3: if $\psi,\lambda=\Theta_{\ell}$ for each $\ell\in\int$, then $\psi,\lambda=\Lambda_{\ell\in\int}\Theta_{\ell}$.

Case 4: if $t\tilde{\sim}_{\tilde{\kappa}}g$, and $\kappa m(\iota)\cap\tilde{\kappa}=\emptyset$,t then $\psi,\iota\models g_{\tilde{\kappa}}$, where $\iota=(|\iota,t|)$;

Case 5: $\psi,\iota\models\langle y\rangle\Theta$ if $\iota\xrightarrow{\partial,y'}\lambda$ for some y',∂, and λ, so that $\psi,\lambda\models\Theta$, $\psi(\partial)=u$, and $y=_{\psi}y'$;

Case 6: if $g\in D_{\iota}\left(\theta\overline{\kappa m(\iota)}\right)$ and $\psi,g(\iota)\models\Gamma$, then $\psi,\iota\models g.\Gamma$, where $g(\iota)=(|\iota,gt|)$ of all times $\iota=(|\iota,t|)$;

It is proved that such a behavioral process which is the logical L accurately describing the behavior from quantum snapshots to symbolic duplicity. Therefore, by analyzing the structure of Θ, another distribution function Θ'which satisfying $\psi,\lambda\models\Theta'$ but $\psi,\aleph\not\models\Theta$ is constructed. But in order to prove is more complicated, first of all, let's assume that the distribution functions of $\lambda \neq_L^\psi \aleph$ and Θ are $\psi, \lambda \not\models \Theta$ and $\psi, \aleph \models \Theta$. $\Theta = \rho \underset{\sim}{>}_Y (\Gamma)$. Suppose $D = \{\pi \in DG : \psi, \pi \models \Gamma\}$ and $\bar{D} = DG - D$. Then, based on the notion, $\aleph(D) \underset{\sim}{>} Y$but $\lambda(D) \underset{\sim}{\not>} Y$.

Suppose $\hbar = \lambda(\bar{D})$ and $\Theta' = \rho_{\geq \hbar}(\neg\Gamma)$. Then $\psi, \lambda \models \Theta'$ will be there. Therefore, it is enough to show $\psi, \aleph \not\models \Theta'$ now. Or $\aleph(\bar{D}) \underset{\sim}{>} \hbar$, and then $\int_{(\theta)} \tilde{\ } \aleph(D) + \aleph(\bar{D}) \underset{\sim}{>} Y + \hbar$. In addition, $\int_{(\theta)} \tilde{\ } \lambda(D) + \lambda(\bar{D}) = \lambda(D) + \hbar$. By comparing the above two functions, $\lambda(D) \underset{\sim}{>} Y$ is deduced from a contradictory conclusion. $\Theta = \Lambda_{\ell \in \int} \Theta_\ell$. Then, based on the notion, $\psi, \aleph \models \Theta_\ell$ for any $\ell \in \int$ but $\psi, \lambda \not\models \Theta_{\ell_0}$ for some $\ell_0 \in \int$. Through the above analysis, because of the existence of $\Theta_{\ell_0}^{'}$, it makes $\psi, \lambda \models \Theta'_{\ell_0}$ but $\psi, \aleph \models \Theta'_{\ell_0}$.

Let $\mathrm{I} = \left\{\Phi \in Dist(Con) : (\pi\psi)(s) \overset{\wp}{\mapsto} \Phi \text{ and not } \mu\mathrm{Rv}\right\}$. Then $\psi, \lambda_c \models \Theta_c$, thus $\psi, cV\Gamma$. Because $\iota =_L^\psi \pi$, there is also $\psi, \pi \models \Gamma$. That is to say, the existence of ∇ makes $\psi(\partial(\nabla)) = u, y =_\psi y(\nabla)$, and $\psi, \nabla \models \Theta_c$. For every $\Phi \in \mathrm{I}$, there is $\pi \xrightarrow{\partial(\aleph_\Phi), y(\aleph_\Phi)} \aleph$, so that $\psi(\partial(\aleph_\Phi)) = u, \Phi = (\aleph_\Phi \psi'')(s)$, and for some $\alpha \notin fm(\pi)$, if $\wp = o?m$ then $y(\aleph_\Phi) = o?\alpha$, and $\psi'' = \psi\{m/\alpha\}$, or else, $\psi'' = \psi$ and $y(\aleph_\Phi) =_\psi \wp$. Next, to simplify the notation, only the following is considered: for each $\aleph$, at most one pair is represented as $(\partial(\aleph)), (y(\aleph))$, so that $\pi \xrightarrow{\partial(\aleph), y(\aleph)} \aleph$.

In addition, through a unitrary transformation, $\psi'' = \psi'$ and $y(\aleph_\Phi) =_\psi y$ can always be deduced. For any $\Phi \in \mathrm{I}$, there is $\lambda_c \neq_L^\psi \aleph_\Phi$. Otherwise, because $c = (\lambda_c \psi')(s)$ and $\Phi = (\aleph_\Phi \psi')(s)$, μRv is owned, a contradiction. Therefore, the existence of $\Theta_\Phi \in L$ makes $\psi, \lambda_c \models \Theta_\Phi$, but $\psi, \aleph_v \not\models \Theta_\Phi$. Let $\Theta_c = \Lambda\{\Theta_\Phi : \Phi \in \mathrm{I}\}$ and $\Gamma = \langle y \rangle \Theta_c$. Otherwise, if $j \in \mathrm{I}$, then $\psi, \aleph_j \not\models \Theta_j$, $\psi, \aleph_j \not\models \Theta_c$. It is a contradiction to launch $\aleph_j = \nabla$ by hypothesis. So $j \notin \mathrm{I}$ and $\mu R\omega$ are required. If for any $\iota, \pi \in T$, there will be $\iota \sim^\partial \pi$, when and only when $\iota =_L^\partial \pi$.

Now, there is $(\pi\psi)(s) \overset{\wp'}{\mapsto} j = (\nabla\psi''')(s)$, so that for some $m \in Real$, if $y(\nabla) = o?\alpha$ then $\wp' = o?m$, and $\psi''' = \psi\{m/\alpha\}$, or else, $\wp' =_\psi y(\nabla)$ and $\psi''' = \psi$.According to the conversion rules O-Inp$_o$, $\wp' = \wp$ and $\psi''' = \psi'$ can always be selected. So the conclusion is $j \notin I$.

5. Conclusions

In the context analysis of legal texts, the quantum clustering is used to maintain the trait of non-growth, which acts on the relevant legal texts and provides convenience and technical support for the analysis of legal texts. Based on quantum operator valued distributions discussed above, Ordinary probabilistic labelled transition systems can be extended to quantum operator weighted ones. In traditional means clustering analysis, four kinds of choosing initial centers methods are applied in our case and their results are compared. The classification results of hierarchical clustering analysis, traditional clustering analysis, and others are analyzed. The experiment results demonstrated cluster analysis methods can be applied to plastics discrimination with LIBS and clustering algorithm can be applied to analyze the knowledge of legal texts.

This system explains how to make full use of CACA, a high-throughput and integrated data-mining environment, to analyze gene lists derived from high-throughput genomic experiments. By quantum clustering, investigators are able to gain an in-depth understanding of the context-awareness themes in lists of genes that are enriched in genome-scale studies and text analysis of legal texts has also been further developed during this period. Quantum clustering has excellent properties guaranteed by physical principles and makes great influence on traditional method. Through performance analysis, it is shown that this solution has good clustering properties. Quantum clustering also has high security, so it can also be applied to the analysis of legal texts to ensure the security and confidentiality of legal events.

Acknowledgments

This research was supported by the National Natural Science Foundation of China (No. 71471102), and Yichang University Applied Basic Research Project in China (Grant No. A17-302-a13).

References

1. Bhasuran Balu, Subramanian Devika, Natarajan Jeyakumar. Text mining and network analysis to find functional associations of genes in high altitude diseases[J], Computational Biology And Chemistry. 2018; 75:101-110.
2. Huang Da Wei, Sherman Brad T, Lempicki Richard A. Systematic and integrative analysis of large gene lists using DAVID bioinformatics resources [J], Nature Protocols. 2009; 4:44-57.
3. Polanczyk Guilherme, de Lima, Mauricio Silva, Horta Bernardo Lessa. The worldwide prevalence of ADHD: A systematic review and metaregression analysis [J], American Journal Of Psychiatry. 2007;164:942-948.
4. Gefen David, Miller Jake, Armstrong Johnathon Kyle. Text analysis can reveal patterns of association among medical terms and medical codes[J], Communications Of The ACM. 2018; 61:72-77.
5. Huang Da Wei, Sherman Brad T, Lempicki, Richard A. Systematic and integrative analysis of large gene lists using DAVID bioinformatics resources [J], Nature Protocols. 2009; 4:44-57.
6. Edgar Robert C. Search and clustering orders of magnitude faster than BLAST [J], Bioinformatics. 2010; 26:2460-2461.
7. Matthews G Peter, Levy Charlotte L, Laudone Giuliano M. Improved interpretation of mercury intrusion and soil water retention percolation characteristics by inverse modelling and void cluster analysis[J], Transport In Porous Media. 2018; 124:631-653.
8. He Liao, Wang Qianqian, Zhao Yu. Study on cluster analysis used with laser-induced breakdown spectroscopy [J], Plasma Science & Technology. 2016; 18:647-653.
9. Caesar Lindsay K, Kvalheim Olav M, Cech Nadja B. Hierarchical cluster analysis of technical replicates to identify interferents in untargeted mass spectrometry metabolomics[J], Analytica Chimica ACTA. 2018; 1021:69-77.

10. Maran Vinicius, Machado Alencar, Machado Guilherme Medeiros. Domain content querying using ontology-based context-awareness in information systems [J], Data & Knowledge Engineering. 2018; 115:152-173.
11. Zhang Daqiang, Huang Hongyu, Lai Chin Feng. Survey on context-awareness in ubiquitous media [J], Multimedia Tools And Applications. 2013; 67:179-211.
12. Gasparetti Fabio. Personalization and context-awareness in social local search: state-of-the-art and future research challenge s[J], Pervasive & Mobile Computing. 2017; 38:446-473.
13. Xue Hong, Yan Yang, Hou Yong. Novel carbon quantum dots for fluorescent detection of phenol and insights into the mechanism[J], New Journal Of Chemistry. 2018; 42:1485-11492.
14. Guodong Li, Qi Morozov An, Sergey I. Determining ideal strength and failure mechanism of thermoelectric CuInTe2 through quantum mechanics[J], Journal Of Materials Chemistry A. 2018; 6:11743-11750.
15. Dai Guiping, Wang Yong. Single Sign-On Under Quantum Cryptography [J], Journal of Nanoscience And Nanotechnology. 2014; 53:188-193.
16. Haoyang Wu. Quantum mechanism helps agents combat "bad" social choice rules [J], International Journal Of Quantum Information. 2011; 9:615-623.