Research on Decision Support Service Model Based on Big Data

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Abstract

With the rapid development of big data, the potential value of data resources urgently needs to be tapped and utilized. More and more companies choose the form of alliances to realize the complementary advantages of data resources. Sharing data resources of alliance members can flexibly support corporate decision-making according to market needs and provide decision-making support services for society more efficiently. Based on analyzing the research status and related concepts of big data alliances, decision support, and service models in various countries, this paper reveals the coupling mechanism of big data alliance decision support services based on the hypercycle theory. On this basis, according to the characteristics of user needs, two decision support service models of big data alliance based on complete user information and incomplete user information are constructed. The decision support service model is based on complete user information, including user demand description, information search and matching, service plan formation and delivery and feedback, and interactive and follow-up service methods. Decision support service mode based on incomplete user information, including user demand mining, missing information supplementation, service plan formation and delivery and feedback, and detailed consultation and multiple negotiation service methods. The Big Data Alliance promotes cooperation among various industries in providing decision support services. Vigorously promote the application of big data and the technological achievements of the big data alliance in various industries and realize the complementation of data resources in different industries and multiple dimensions. Promote the overall development level of member companies in the Big Data Alliance.

Keywords: Big data, Decision support, User information, Service model

1. Introduction

Big data, as another disruptive technological change in the IT industry after the Internet, the Internet of Things, mobile computing, and cloud computing, is leading a new wave of productivity growth and consumer surplus. In the big data environment, data and demand dual-driven decision-making pay more attention to the correlation between data resources and discover the potential value of data resources. To a greater extent, the excessive reliance on the decision-making power of domain experts is overcome, and the accuracy of decision-making is improved. Whether the decision is correct or not directly affects the survival and development of an enterprise. How to use data resource management for decision support services has become a key issue that needs to be resolved.

The Big Data Alliance (BDA), as a new form of alliance organization, can not only realize the interactive sharing of data resources but also use data resource barriers to avoid risks caused by data resource islands. Marchand pointed out that companies should pay attention to technical issues and focus on the resulting transformation of management decision-making models [1]. Having an advantage in data resources is equivalent to having an advantage in decision-making. From the traditional elite decision-making model to a non-linear, uncertainty-oriented, bottom-up decision-making model, it is manifested in the expansion and downward movement of decision-making participants in the decision-making process, such as pre-foresight, perception during the event, and feedback after the event. Traditional management decision-making is goal-driven, focusing on analyzing data resources' causal relationship. It often pays too much attention to details and lacks an overall grasp and understanding of the overall situation. It is no longer sufficient to respond to new demands in the big data environment. For enterprises to break through the barriers of data resources, obtain additional data resources, dig out the potential value of data resources, and serve in management decision-making, forming alliances has become an important choice. BDA focuses on serving companies from all walks of life to cooperate, vigorously promote the application of data resource technology in all walks of life, and promote the overall development level of the big data alliance. The Big Data Alliance insists on the comprehensive aggregation, in-depth mining, and efficient application of data resources. Carry out comprehensive and in-depth cooperation and construct a data resource ecological chain to promote the healthy and innovative development of data resources to provide enterprises with better decision support services.

This article, therefore, takes the big data alliance as the research context and the user needs as the starting point to create the decision support service model of the big data alliance. The Big Data Alliance integrates big data, Internet, and other data resource processing technologies, and through continuous interaction and collaboration with users, the decision support process is service-oriented. To provide users with a pay-as-you-go, personalized, dynamic, innovative, and intelligent decision support service.

2. Research status

In the area of big data management research. Akoka pointed out that in terms of big data management applications, the Internet, cloud computing, and mobile social media should be combined to maximize the value of data [2]. Ali et al. send the data to a centralized server and use the existing business intelligence and big data analysis software for further processing and analysis to manage the diverse data better [3]. Correa et al. analyzed the existing intelligent measurement big data analysis and processing technology and explored its potential performance [4]. Mckay et al. proposed new ideas for big data management skills by constructing accurate measurement models to optimize data processing speed and standardization [5]. Golov and Manco have researched big data management issues, constructed a big data management model, and proposed a highly standardized method [6][7].

In terms of big data application research. Manco et al. analyzed the traffic big data and obtained the probability of traffic accidents through the data analysis model [8]. Pramanika and John believe that B2B relationships are very important. They provide mutual benefits to offset the resource-intensive costs required for relationship establishment and maintenance. The results show that the impact of big data applications on enterprise product revenue is different [9][10]. Nils and others applied big data to the project implementation process. They evaluated the indicators involved in the implementation process. The results showed that the

application of big data played a positive role in project implementation [11]. Chahine et al. proposed a hypothesis by analyzing medical big data; they believe that improving medical education can improve patient care, and clinical results prove the hypothesis [12].

The Research Data Alliance (RDA) is an international organization [13] established in 2012 to provide a forum for researchers to identify and eliminate barriers to data sharing. RDA already has more than 3,000 individual members, more than 30 organization members, 47 interest groups, and 17 working groups. They all focus on researching data sharing. They believe that interoperability is an example of data sharing but is not the only obstacle. [13]. Treloar et al. studied the reasons for forming the Data Alliance (RDA), the research status, the experience and lessons of the first year of operation, and the expected impact on data release and sharing [14]. Foreign research on big data alliances was earlier, and a batch of big data alliances was established to promote the dissemination and application of data resources. The New Jersey Big Data Alliance provides access to big data technology and expertise, promotes multi-institutional and public-private collaborative research, and strengthens New Jersey's network infrastructure construction to promote local economic development and enhance competitiveness. Fraunhofer Big Data Alliance is committed to biomedical research and development. Due to the complexity of data, application-independent data integration is not feasible. Machine learning algorithms are believed to evaluate data to identify disease mechanisms or appropriate treatments, human-centered incremental interactive data integration, and high-throughput processes in life sciences. It is pointed out that the digital transformation in life sciences has led to more and more data that needs to be stored and analyzed appropriately to realize its huge potential in medical research and health care.

In terms of research on decision-support methods. The D-S evidence theory proposed by Dempster AP is an important uncertainty reasoning method [15]. Rota G C improved it to make it more complete [16]; Hua Z (2008) and others considered the focal elements that may appear in the incomplete information matrix and ranked them according to the confidence interval of the alternatives [17]. In current research, some scholars have applied the method of distance measurement to decision-making problems. This method compares the alternatives with the ideal results and selects the one closest to the ideal results.

In the research of decision support systems. Peter proposed that computer applications will also be developed for information decision-making. Since then, many scholars have carried out research on it, and decision-support systems have begun to be applied in all walks of life. First, decision support systems have been introduced in the securities industry, which can give investors suggestions to help them make decisions. Later, some scholars applied their intelligent learning to the decision-support system, and the intelligent decision-support system was born [18][19].

3. Big data alliance service coupling mechanism and decision support service mode architecture

3.1 Reasons for the formation of Big Data Alliance and organizational form

Pateli proposed a concept of alliance expected value (EAV) to analyze various cooperation states of alliances [20]. The members of the Big Data Alliance process data resources through the service platform realize the sharing and interactive services of data resources, improve the overall utilization rate, and reduce the use cost of data resources through scale effects. The platform integrates the data resources provided by the member companies in the alliance,

which improves the utilization value of data resources. It uses the innovative power of the alliance member companies to collaborate to create more data resources.

Domestic and foreign scholars have classified alliances from different perspectives. The most representative classifications mainly include the following views:

1. From the perspective of the degree of participation of members: According to the degree of participation between alliance companies and the degree of alliance closeness, the types of strategic alliances can be divided into:

(a) Equity-based strategic alliances, such as alliance companies, involve equity participation and cooperation through equity participation. Generally, there are two types of equity participation: equivalence and mutual ownership. The cooperation between members of this type of alliance is very close, so the stability shown is relatively strong.

(b) Contract-type strategic alliances. This type of alliance is mainly based on alliances established by alliance companies. The alliance companies do not involve equity participation and are established on the premise of joint technology development or market development. Therefore, the formation and dissolution of contract-based strategic alliances are relatively more flexible than equity-based strategic alliances.

2. From the perspective of mutual relations in the supply chain According to the mutual relations of alliance enterprises in the supply chain, the types of strategic alliances can be divided into:

(a) Vertical alliances comprise upstream and downstream enterprises in the product supply chain.

(b) Horizontal alliances are formed by companies producing similar products at the same link in the product supply chain to avoid malicious competition and monopolize the market.

(c) A hybrid alliance, that is, a coalition formed by enterprises, not only has the characteristics of a vertical alliance but also the characteristics of a horizontal alliance, which is a comprehensive alliance.

3. From the perspective of alliance formation requirements, Different types of strategic alliances can be divided into different types of strategic partnerships:

(a) Production-oriented strategic alliances, that is, to reduce product manufacturing costs, alliance companies obtain scale advantages and economies of scope and jointly produce and manufacture products with other companies. After forming this type of alliance, the member companies' organizational structure and management mode will not change. Still, it will focus on the production capacity of the alliance companies.

(b) Market-oriented strategic alliances, that is, alliance companies achieve the goal of breaking through market barriers, reducing product sales costs, and expanding market share through exchange and sharing of market sales channels. Such alliance companies have high market share and specific sales channels, usually appearing in the form of price alliances and marketing alliances.

(c) Learning-oriented strategic alliance, that is, the alliance enterprises take new technology research and development as the premise, learn from each other in collaborative research and development, and realize innovative organizational forms through knowledge transfer, sharing, and integration.

3.2. Coupling mechanism of big data alliance decision support service based on hypercycle theory

A decision-making problem refers to the decision-makers making the best action plan based on the collected intelligence through analysis and processing in the design, selection,

implementation, and other links. However, actual decision-making problems often involve complicated environments, elements, structures, functions, and models due to different factors such as the decision-making environment, degree of structure, decision-making goals, and nature of decision-making, making it difficult to make decisions with conventional methods. Based on its resources and technical advantages, the Big Data Alliance can solve complex decision-making problems for users that traditional methods cannot solve. The decision-making problems are classified according to different standards to make more scientific and effective decision-making, as shown in Table 1.

Table 1. Classification of decision problems

Classification Standard	Content
Degree of structure	Structured decision, semi-structured decision, unstructured decision
Environment	Deterministic decision, risky decision, uncertain decision
Business level	Strategic decision, campaign decision, tactical decision
Target number	Single-objective decision, multi-objective decision
Decision method	Qualitative decision, quantitative decision, qualitative and quantitative comprehensive decision
Number of decision-makers	Individual decision-making, group decision making
Decision location	Centralized decision-making, distributed decision-making
Rationality	Rational decision, behavior decision
Continuity of decision-making process	Phase decision, sequential decision
Concentration of decision-making authority	Centralized decision-making, decentralized decision-making

The big data alliance decision support service has the following characteristics:
(1) Consistency of goals.
(2) Participation of multiple decision-making entities.
(3) High degree of resource sharing.
(4) The decision-making stages are interrelated.
(5) There is a need for sustainable development.
(6) Participation in decision support service platform.
(7) Rapid response to market opportunities.
(8) Professionalism of decision support services.

The Big Data Alliance takes advantage of its large number of decision-making resources and a variety of artificial intelligence technologies to transform the decision-making intelligence system of the Big Data Alliance into the user's central decision-making brain, provide users with the results of decision support services, and dig deeper into decision-making resources Causality. However, the results of these intelligent predictions must undergo specific processing before they can be transformed into decision-support service solutions delivered to alliance users. The Big Data Alliance uses information analysis, processing capabilities, and artificial intelligence technology to calculate and integrate the decision-making resources required for decision-making support services. An in-depth exploration of the causal relationship behind decision-making resources promotes the release of the potential value of decision-making resources in the big data alliance and realizes further value appreciation.

1. Conversion cycle reaction: The first level, "conversion reaction cycle," is the initial cycle reaction, which is the process of reaction unit generating products under external action. The reaction unit generates new intermediate products under the action of the catalyst, and the intermediate products form new products through self-creation. The new products participate in the next conversion reaction under the action of the catalyst, thus forming a reaction cycle.

2. Catalytic cycle reaction: In providing decision support services by the Big Data Alliance, the new decision support service resources, requirements, and platform services generated in the previous stage are all used as catalysts for the catalytic reaction cycle. At the same time, it catalyzes the matching of supply and demand during the reaction. The catalytic reaction of the second level, the "catalytic reaction cycle," is based on the first level and consists of multiple conversion reaction cycles. In the first stage, self-replication is continuously carried out, and the catalysis is generated from the catalyst so that multiple transformation reactions are fused and connected to form a cycle capable of autocatalytic reactions.

3. Hypercycle: The third decision-making level is the "super cycle." The super cycle of the third level is the most advanced reaction, a complex reaction cycle composed of a continuous conversion reaction cycle and a catalytic reaction cycle. Hypercyclic reactions can create and replicate themselves, and each cyclic unit will continue to merge and cross-catalyze each other, making them more closely related. Hypercyclic reactions will continue circulating and accumulating resources, thereby developing to a higher level. The supercycle process is shown in Figure 1.
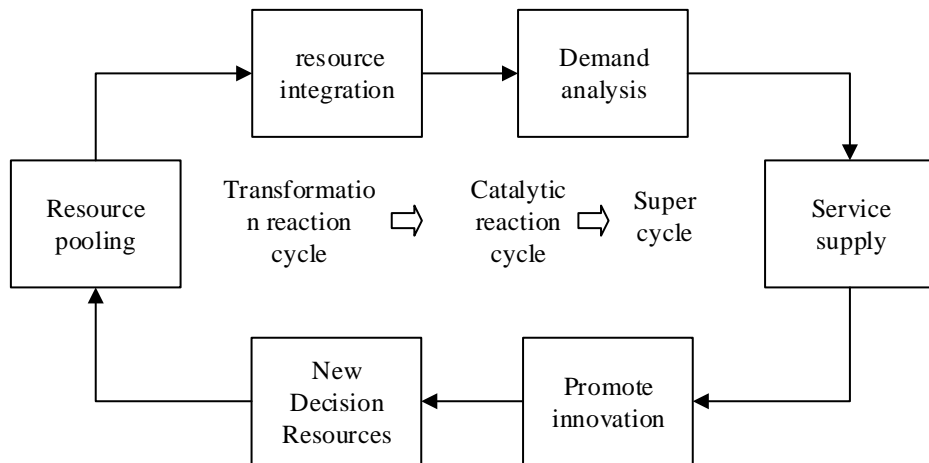

Figure 1. Supercyclic process

Among the decision-making problems faced by the big data alliance are the alliance members who impact the decision-making task and play a leading role in decision-making problem-solving. The knowledge reserves, capabilities, and preferences of the alliance decision-making members greatly impact the outcome of the decision-making task. Influences. The American management scientist H.A. Simon divides the decision-making process into four stages, namely the intelligence stage, the design stage, the selection stage, and the delivery stage. Complete the collection and processing of decision-making information in the intelligence phase. The design phase completes the feasibility plan based on the existing resource discovery and analysis. The final plan is determined in the selection stage among various feasible decision-making plans. According to the four-stage model of big data value incubation and value-added, it is mapped to the big data alliance to provide

users with decision support services, and the process of gestation, germination, expansion, and breakthrough of decision resources is shown in Figure 2.
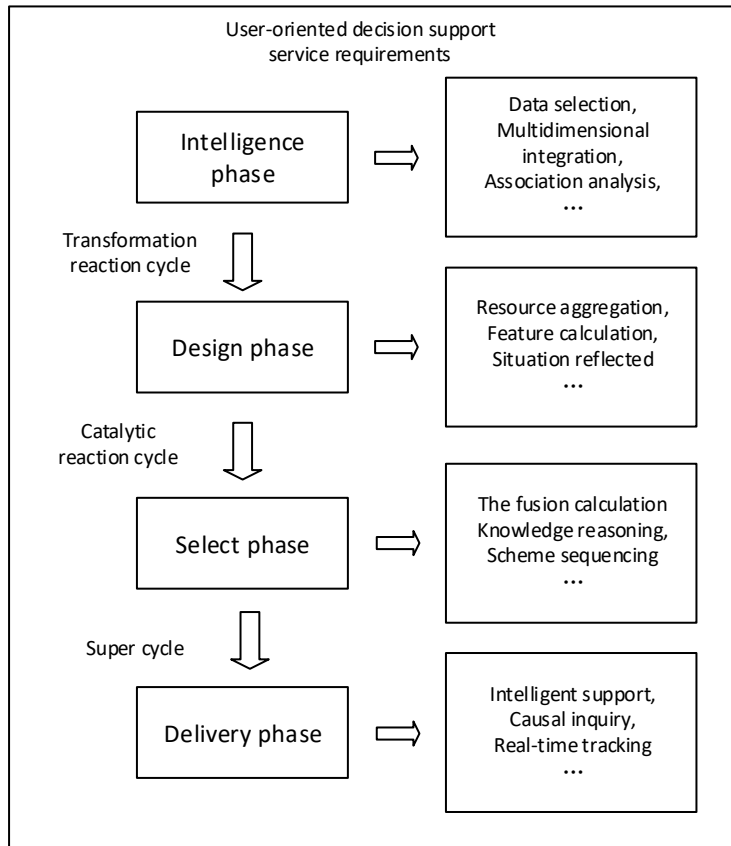

Figure 2. Service level relationship

3.3. Big data alliance decision support service model architecture

The Big Data Alliance uses artificial intelligence technology, big data processing technology, and other technological advantages based on its resources. According to the synergy theory, alliance members in the significant data alliance decision support service result generation process, all-round realization of big data alliance decision support service plan design, processing, inspection, and other communication and interaction processes. Mining effective and accurate information from the massive decision-making resources of the Big Data Alliance to form decision-support service plans at different stages. Efficiently assist alliance users in solving their decision-support service problems in specific situations, realize the value discovery process of data from knowledge to intelligence, and ultimately assist them in decision-making.

The big data alliance decision support service model uses multidisciplinary demand analysis theory to explore users' real decision support service needs in the big data alliance and further describes the needs of the alliance users, including the reasons, processes, and expected goals of the demand for decision support services. Then, clarify the direction of decision-making resource integration. According to the core decision support service requirements, the Big Data Alliance uses intelligent resource transmission technology to

efficiently transmit the decision resources required for decision support services and accurately realize the resource perception and access of the cloud. Make preparations for integrating decision support service resources, which can effectively incorporate multi-dimensional data resources. Realize the fusion calculation of the decision resources required in the decision support service, thereby discovering the implicit and causal relationship between the resources required by the decision support service.

The main body of the big data alliance decision support service refers to the provider and receiver of the decision support service. It mainly includes the decision support service provider and the alliance user. The two main bodies are the decision support service provider and the decision support service user. Based on the characteristics of big data alliance user needs, including two situations of complete and incomplete user demand information, a process model for the decision support service of the big data alliance is constructed. As shown in [Figure 3].
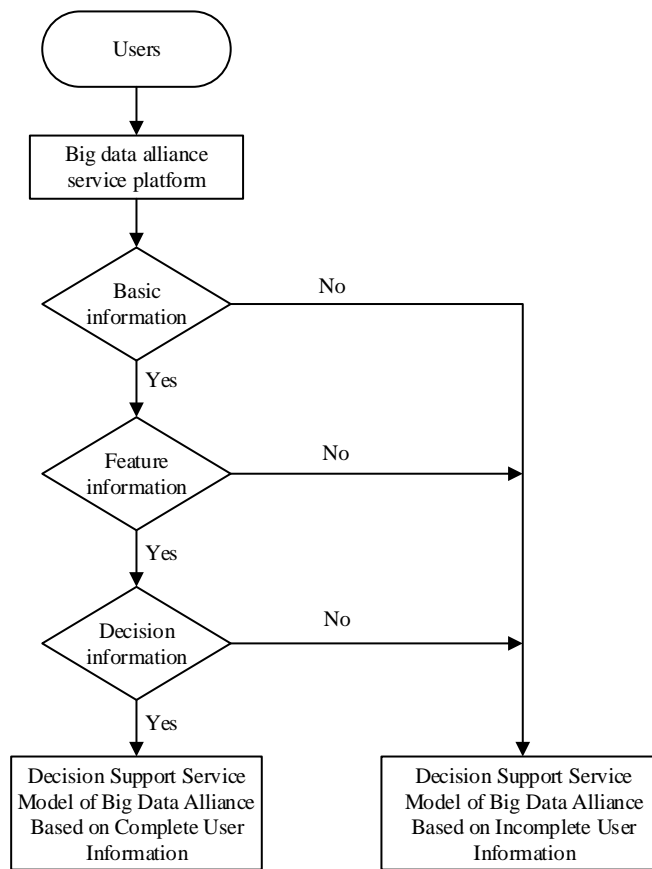

Figure 3. Big data alliance decision support service process

The decision support service provided by the Big Data Alliance relies on service-oriented thinking, combined with the service hierarchy structure, and designed a hierarchical service model that conforms to the decision support system. The purpose is to clarify that the Big Data Alliance provides users with the required decision support services. The decision support service system architecture of the Big Data Alliance consists of four levels: service support layer, service coordination layer, service core layer, and service auxiliary layer.

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The Big Data Alliance promotes the effective transfer and utilization of data resources. It enhances the density and activity of data resources based on its advantages in gathering data resources from multiple parties. The heterogeneous data in the data resource pool is aggregated, correlated, and fused to provide auxiliary support for better user decision-making and realize the value-added of data resources. In the process of providing decision support services to users by the Big Data Alliance, it is necessary to provide users with the required decision support services in an efficient and targeted manner to meet the diverse needs of users at different levels of decision support services. The final results of decision support services are delivered to users in the form of solutions to meet the differentiated decision-making needs of users. The big data alliance decision support service model is flexible and convenient. The core idea of its design is to satisfy the decision-support service requests of different users as much as possible. This article examines the complete and incomplete situation of the user's demand information according to the user's demand characteristics at various periods in the decision-making process. The big data alliance decision support service model is divided into the big data alliance decision support service model based on complete user information and the big data alliance decision support service model based on incomplete user information. Figure 4 is the framework of the big data alliance decision support service model
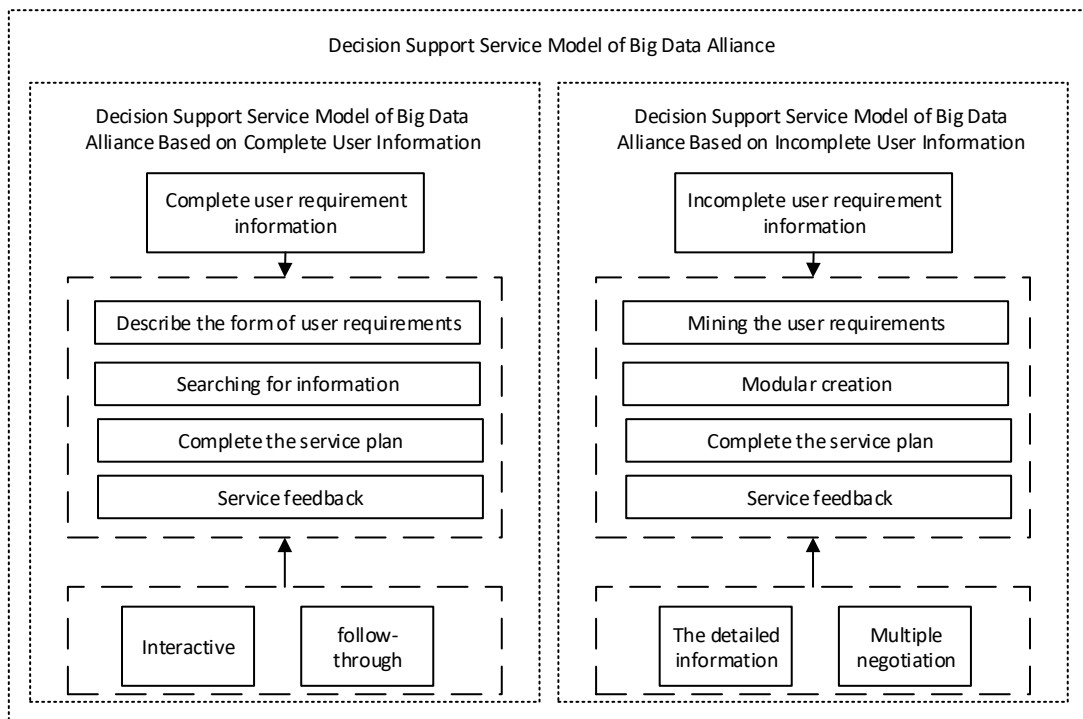

Figure 4. Service pattern framework

4. Big data alliance decision support service model based on complete user information

4.1. Description of user requirements

1. User basic information description. The big data alliance decision support service model is based on complete user information. Users can prepare to describe the basic information of

their decision support services, including what they need to do, the purpose of decision support services, and how to provide decision support services. After the Big Data Alliance receives basic user information, it analyzes and processes it.

2. User demand information description Big data alliance user demand description refers to establishing a scientific decision support range demand expression model. The user's decision support service is expressed appropriately, which is conducive to the big data alliance to conduct the resource search and matching activities required by the decision support service. Due to the diversified types of alliance users, the expression types and storage structures of information transfer between different members are quite different, which is not conducive to the processing of demand information by the big data alliance and reduces the efficiency of decision support services.

The quality of the Big Data Alliance's decision support service determines the user's satisfaction, so meeting the user's demand for decision support service quality is an important prerequisite for improving the user's satisfaction with the Big Data Alliance's decision support service. The big data alliance decision support service quality index based on complete user information mainly includes decision support service cost, response time, and reliability, expressed as $QoS = < C(S), (\ )\, TS, R(S) >$. Among them, $C(S)$ represents the cost of decision support services, $T(S)$ represents the time of decision support services, and $R(S)$ represents the reliability of decision support services.

(1) Cost of decision support services. The cost of decision support service refers to the cost that users need to pay. Decision support service cost $C(S)$ (C1 is the cost of decision support service delivery, C2 is the cost of decision support service in operation) is expressed as follows:

$$C(S) = C_1 + C_2$$

(2) Decision support service response time. The response time of decision support services reflects the capabilities of the Big Data Alliance, which is the time it takes for users to submit a decision support service request from the service port to obtain a decision support service plan. Set the response time of the big data alliance decision support service based on complete user information as $T(S)$, $T_{pro}(i)$ is the processing time of the decision support service, $T_{trans}(i)$ is the time from the submission of the decision support service to the receipt of the result, n represents the number of executions of the decision support service. The response time formula of the big data alliance decision support service based on complete user information is as follows:

$$T(S) = \sum_{i=1}^{n} (T_{pro}(i) + T_{trans}(i))\big/n$$

(3) Reliability of decision support services. Reliability refers to the ability of big data alliance decision-making services based on complete user information to execute during operation. Assuming that the number of times of executing the big data alliance decision support service S between $(0, t)$ is n, and the number of normal executions is n_i, the reliability of the big data alliance decision support service based on complete user information is expressed as follows:

$$R(S) = n_i/n$$

4.2. Decision support service information search and matching

A search and matching model of decision support service demand is proposed to improve the efficiency of significant data alliance user demand and decision support service search.

(1) Basic information search. According to the user's decision support service requirements, the search for the required decision resources in the virtual decision support service pool marks the beginning of the search.

(2) Domain information search. After searching the basic information of decision support services, according to the definition and description of decision support service requirements, the search is mainly carried out from the information of decision support services.

(3) State information search. After searching for information in the decision support service field, within the scope defined by the user's decision support service requirements, the leading search is for the status of the decision support service to clarify the service characteristics that the decision support service can provide.

After the above three levels of search, the user-oriented decision-support service needs are matched, and the decision-support service resources that meet the user's decision-support service needs are matched.

4.3. Formation and delivery of decision support service plans

The service plan formation process is based on obtaining a set of decision-support services to provide users with high-quality decision-support service plans. This paper describes the problem of decision support service composition and then establishes and solves the optimization model of decision support service composition. In the Big Data Alliance, demand-based task flow means selecting and combining decision-support service resources from a decision-support virtual data resource pool. Decision support service resources are processed by the big data alliance decision support system, and different alliance members extract, clean, and transform the decision resources. In the need of decision support programs, different members call the corresponding method library, model library, and knowledge base according to their tasks to complete their assignments. At the same time, it coordinates the information exchange between the database system, the model library system, and the method library system and provides functions such as information collection, problem identification, model analysis, and calculation for the big data alliance decision support service, and finally forms a decision support service plan.

Service delivery fulfills the criteria and activities of the user's decision support service. A single decision support service is selected from the data resource pool of the decision support service and converted into a sequential service using existing technology. In the process of providing decision support services to users by the Big Data Alliance, what users ultimately purchase and use is a decision support service plan, and what the Big Data Alliance finally delivers to users is a complete set of decision support service plans. Based on the actual situation of the Big Data Alliance, which provides users with decision support services, the Big Data Alliance will deliver the corresponding decision support service plan according to user needs, and the user will pay for the service according to the agreement. In decision support service delivery, management of qualification and identity authentication, service level agreement confirmation, decision support service application, change, etc., is carried

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out. The big data alliance will also form a service list that users can query. As the main body of decision support services, the big data alliance and users can use the service monitoring tools of the big data alliance to realize collaborative management and control of the delivery of decision support services and discover services. The faults in solution delivery shall be solved in time.

5. Big data alliance decision support service model based on incomplete user information

5.1. User demand mining

Data generation in the information age is breakneck, and user needs have also changed due to the characteristics of diversity and randomness. Due to the complexity of decision-making issues and other reasons, users may not realize or fail to express their needs clearly. This requires external guidance and assistance—mining deep-level decision support service needs. Based on the user context experience theory, the decision support service platform is used to conduct mining statistics from multiple dimensions of users' browsing behavior, purchasing habits, and personality characteristics and combine the actual situation of user needs to construct a conceptual model of user needs identification of the Big Data Alliance. The Big Data Alliance obtains basic data information such as user attribute information, browsing records, demand question domains, guided question, and answer, etc., through users' search and browsing records on the decision support service platform and combines data processing technologies such as machine learning algorithms and artificial neural networks. Realize the user's multiple dimensions fuzzy decision support service needs to display the results, discover the potential contact rules of the user's needs, and then extract the user's hidden information.

5.2. Formation and delivery of decision support service plans

Baldwin et al. pointed out modularity is constructing complex businesses and products through multiple independently functioning units. Applying modularity to decision support services based on incomplete user information, the modularity of providing decision support services is defined as: according to the relationship between decision support service links and elements, members divide labor and collaborate to construct service modules. The various sub-modules form the decision support service information users require through the transmission of information and spatial rules.

Based on the extension theory, this paper constructs the extension service model of the big data alliance decision support service model based on incomplete user information. First, the contradiction problem, the incomplete user information, and the unbalanced contradiction between the decision support service plan and the use of decision support service module primitives are defined. According to the decision support service demand of incomplete user information, it can be extended and transformed, and finally, a targeted decision support service plan is formed.

1. Defining contradictory issues: In providing decision support services for users, the Big Data Alliance provides products and a single service and a solution that organically integrates products and services.

2. Matter, Matter, and Relational Elements of the Big Data Alliance Under the coordination of unified rules, the members of the Big Data Alliance form a dynamic network with low transaction costs through the division of labor and collaboration. The ordered triple

R= (N, C, V) is formed by taking things N as the object, C as the characteristic, and the magnitude V of N concerning C is called the basic element describing things, then the matter element of the big data alliance. The expression is:

$$R_{Big\ Data\ Alliance} = R_{Member\ 1} + R_{Member\ 2} + \cdots + R_{Member\ k} + \cdots R_{Member\ n}$$

among them,

$$R_{Member\ k} = (N_{Member\ k}, C_{Member\ k}, V_{Member\ k})\ ,\ C_{Member\ k} = \begin{bmatrix} C_{k1} \\ C_{k2} \\ \cdots \\ C_{kn} \end{bmatrix},\ V_{Member\ k} = \begin{bmatrix} V_{k1} \\ V_{k2} \\ \cdots \\ V_{kn} \end{bmatrix} (k =$$

$1.2, \dots, n)$

In the same way, for the business cooperation relationship between member companies in the big data alliance, the matter element (I) and relationship element (Q) of the alliance can be established.

(3) Extensible transformation, based on the core needs of users, based on the significant data alliance decision support service architecture. Implement extension transformation to service module primitives, adjust and configure service elements and service content in time. Establish the mutual connection between the user's core needs and the service plan, and output the extension service decision support plan—the extension service model of the big data alliance.

Continuous interaction with users is required to deliver decision support services to users in the Big Data Alliance. According to the actual operation of the big data alliance and the decision-making needs submitted by users, the big data alliance decision support service platform provides a variety of channels and ways to purchase decision support services. Browse and operate from various mobile terminals, such as computer desktops, mobile phones, tablets, etc., to facilitate users to browse and receive service plans. The Big Data Alliance establishes and saves documents based on resource browsing and usage, including archiving transaction information in decision support service delivery. The big data alliance and users can keep abreast of the progress of each stage of the service process and realize the collaborative management and control of decision support services.

6. Conclusion

Through the analysis of the big data alliance, decision support system, and decision support service levels, this paper reveals the reasons for the formation of the big data alliance, the decision support service process, and the elements and frameworks of the big data alliance decision support service model, combined with the inherent characteristics of the big data alliance. The characteristics and background have constructed a big data alliance decision support service model. The research on the big data alliance is still in its infancy. Most existing research results are based on strategic alliances, knowledge alliances, industry-university-research alliances, and data alliances. The key technologies, architectures, and data resource-sharing research on utilization are seldom carried out. As the core of the big data alliance, data resources play an essential role in constructing the big data alliance, the alliance's stability, and the alliance members' cooperation. Starting from the analysis of the big data industry chain, the data resource service of a single big data enterprise is extended to the field of big data alliances. Relying on the high-performance computing capabilities of the big data alliance to build a decision support service model and striving to improve the big

data alliance decision support service efficiency and corporate competitiveness will become the future research direction.

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