

Design of Semantic Data Linking for Customer Value Management in the Smart Finance Environment on Bigdata and Artificial Intelligence

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Abstract

The concept of 'customer Bigdata' that utilizes, analyzes and utilizes data derived based on accurate, broad data and scientific methodologies is now being used throughout management instead of the usual, practice, experience, and benchmarking practices used in past management. In particular, for companies that need to detect customer changes in the rapid changes in the market, they are seeking to combine customer Bigdata analysis and utilization in customer value management with the aim of taking the lead in marketing and strengthening competitiveness. However, due to the duality of representation on customer data in which data collection for accurate analysis of customer data has the same meaning, it causes information loss and distortion of information about customers' information. Thus, this study proposes a new model in the web of customer data in a smart financial environment that reduces distortion and omission of customer data and enables accurate customer Bigdata analysis by connecting a large number of data with the same meaning but different expression.

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1. INTRODUCTION

The purpose of this study is to enhance the reliability of data on customer Bigdata [1-11] analysis and utilization of customer value management by designing a so-called 'SLM' model for connecting data meaningfully before analysis of customer data in a smart financial environment on artificial intelligence [12-15]. The study is conducted in a total of five stages as follows: (1) Study the basic concepts of customer Bigdata, customer value management, and data connection technology, and review the traditional data connection method, the formal data connection methodology. It also draws a threshold for the reliability of the data connection of this methodology. (2) As a semantic connection method of data to overcome limitations of existing methodologies, a semantic data similarity evaluation method is developed by dividing it into a descriptive grammatical element evaluation, a vocabulary-defining grammatical element evaluation, and an improvement in similarity level. (3) Combining this similarity evaluation method, construct a model for the

connection of reliable data and complete specific modules such as object-based connection policy, object-based similarity list generation, and grammatical complementary connection policy specification. (4) Develop specific algorithms for implementing this model. (5) To verify the effectiveness of the research model, conduct an experiment to draw a conclusion that the semantic connection reliability is better than the traditional method of coupling SILK and LIMES.

2. RELATED WORKS

2.1 Customer Bigdata Concept for Decision of Management

The concept of 'customer Bigdata' that utilizes, analyzes, and utilizes accurate and broad data in a smart financial environment and scientific methodologies has become an important part of corporate management and public organization performance. Instead of weak decision-making methods such as conventional wisdom, practice, experience

and benchmarking that have been used in past management, these days, a decision-making method based on evidence-based management is being used throughout management. Stanford's "Jeffrey Pepper" chair professor states in his book *Hard Fact* on the need for "decisions based on best evidence." The concept of "customer Bigdata," which has recently become an issue across society, is an important management resource to support this evidence-based management, and the more evidence data there is, the more sophisticated and systematic the decision theory that utilizes customer Bigdata can be. The brisk investment in customer Bigdata in the management field is competitively becoming a reality through many companies, leading to the belief that customer Bigdata processing ability will lead to increased management profits through productivity improvement and competitiveness based on evidence-based management.

2.2 Necessity of Customer Bigdata in Customer Value Management

Customer value management, introduced by many companies in smart financial environments, has been attributed to an increasingly competitive industry environment and a declining effect of advertising through mass media. In other words, the interest in customer Bigdata in these areas of customer value management is bound to grow due to the belief that effective analysis and utilization of data [16-25] for customers, and customers can secure new customers, maintain existing customers and further drive customer loyalty. At a time when markets are fragmented, mass marketing is inefficient, product differentiation alone cannot secure competitiveness, and customer value management to secure new customers and maintain existing customers has become an important pillar of a company's survival strategy. For companies that need to detect customer changes in response to these market changes, they need to be prepared for intellectualization of customers, changes in customer satisfaction, rising customer expectations, changing customer lifestyles, increasing customer diversity, and decreasing customer loyalty, and, with the recognition that data on customers are absolute for collecting, analyzing, and utilizing customer data, have new leadership.

3. MODEL OF SEMANTIC DATA LINKING

3.1 Customer Bigdata Analysis and Utilization Problems in Customer Value Management

The real value of customer Bigdata analyzed and utilized in customer value management lies in the new business value of data that is conducive to corporate management, namely information extraction that can contribute to corporate sales, rather than in the technical operation of entering, modifying, deleting and retrieving data as it is. The technical limitations of storing, analyzing, and interpreting the customer's data, as opposed to the amount of rapidly expanding data. More accurately, there are clearly technical limitations that store, analyze, interpret and utilize customer data accurately. This

results in the formal collection and operation of stored data, resulting in information leakage and distortion of customer information in the utilization of the data through analysis and interpretation.

3.2 Attempting to Connect the Context based on Open Connection Data

Customer data from the web, a largely unstructured or semi-structured document unit, is recognized as data with different meanings as data about a single customer is stored in different forms. This phenomenon is bound to lead to customer value management, which, however elaborate and sophisticated customer Bigdata analytics, has lost or distorted customer data, losing accuracy and reliability. This study links newly stored and operated facts (data) on the web of customer data in smart financial environments to previously published facts (data), enabling access to them to perform accurate and scalable customer Bigdata analysis and utilization in the future.

3.3 Application of Context Connectivity based on Open Connectivity Data

The semantic link of data through the proposed context-connection method allows companies to significantly reduce omissions and distortions in customer data in collecting and analyzing customer data, which will lead to accurate customer Bigdata analysis of customer data, creating opportunities for effective use in customer value management. The correct operation of data for customers is the work that should be carried out in the analysis of customer Bigdata, which will be utilized as the basis for accurate decision making on a company's customer value management. It can also be applied to the development of new business models of customer value management by combining customer Bigdata analytics with attempts to link meaningfully the same data.

4. DEVELOPMENT OF SEMANTIC DATA LINKING

In order to manage customer value in a smart financial environment, a data link is attempted for accurate data analysis. To do this, the basic concept for research is first needed: the concept of customer Bigdata, customer value management, data connection technology and existing data connection methodologies.

4.1 Customer Bigdata and Customer Value Management

First, we need to understand the exact concept of customer Bigdata in a smart financial environment. The process for enterprises to conduct customer Bigdata analysis and utilization is outlined as follows: Processes are investigated by dividing them into (1) data planning, (2) data design, (3) data operation, (4) data collection, (5) data pre- and post-processing, (6) data storage, (7) data analysis, and (8) data utilization. Second, understand the exact concept of customer value management and investigate the scope and role of customer value management in the management of the

enterprise. In addition, the strategy for customer value management requires an understanding of customer relationship acquisition, customer relationship maintenance, and customer relationship enhancement.

4.2 Data Connection Method and Methodology

Research on basic concepts for semantic data linkage is required: open data connection (LOD, Linked Open Data), ontology, Object Based Link Evaluation (OBLE), RDF/RDFS/OWL, LOD triple connection, etc. In addition, the limitations of SILK and LINES, which are typical methods of traditional data mapping, should be looked at.

4.3 Development of Evaluation Technique for Data Connection

Attempts for semantic connection of data are made by dividing them into subject descriptive grammatical element assessments, vocabulary-defined grammatical element assessments, and improvement of similarity levels. In addition to the existing Object Based Link Evaluation (OBLE) method of assessing similarity by comparing only the object values of specified predicate in the data, attempts at semantic mapping of the data in this study are a new concept of similarity evaluation that facilitates the meaningful connection of the data by taking into account the grammatical characteristics of the predicate described within the data and adding in the data. (1) The subject descriptive grammatical element assessment shall include a hierarchical similarity assessment, a similarity assessment considering the relevant data, a similarity assessment considering the confluence/combination characteristics of the objects to which the data belongs, a similarity assessment considering the homogeneity technology of the objects to which the data belongs, a similarity assessment considering the data belongs, and a similarity assessment considering the reciprocal nature of the data to which the data belongs, and a similarity assessment of the data belongs, a similar characteristics to which it belongs. (2) Vocabulary-definitive grammatical element evaluation is divided into the evaluation of similarity using the definition area of a subject, similarity using the inverse function attribute, similarity using the lexicon appearance frequency, similarity considering the predicate hierarchy, similarity evaluation considering the predicate homogeneity technique, and similarity evaluation using the predicate constraint. (3) The improvement of similarity levels is carried out by dividing them into similarity assessments considering hierarchy-based reasoning and similarity assessments considering symmetrical nature-based reasoning.

4.4 Development of Syntax Linked Method (SLM) Model

As the first step in developing a Context-Linking Method (SLM) model, using this similarity method, a model is constructed to provide the connectivity of reliable data. This model is completed by organizing object-based connectivity

policies, object-based similarity list creation, and grammatical supplemental policy specification. Once the model is complete, specific algorithms are developed to implement this model.

5. UTILIZATION PLAN AND EXPECTED EFFECT OF RESEARCH RESULTS

5.1 Utilization Plan of Research Results

Web-based customer data provides high readability to data users, but it has been difficult to access them automatically and precisely through applications. The concept that emerged to solve this problem was W3C's 'LOD, Linked Open Data', which consists of Resource Description Framework (RDF) triple, based on an ontology specification of the facts that exist, and uses URI (Uniform Identifier). Because of the large amount of data to be connected, companies try to connect to data in an automatic manner, which is often referred to as 'SILK' and 'LINES'. Traditional methods of comparing object values of specified predicate have the limits of making errors that are perceived as different data by generating situations in which data objects are assessed to be not sufficiently similar, even though they are actually the same. Differences in object values between the same objects in practice due to different or different written languages result in insufficient similarity for data mapping. This consequently reduces the reliability of open-connected data, resulting in the inability to provide accurate data materials for customer Bigdata analysis. However, the 'SLM, Syntax Linked Method' proposed in this study attempts to connect data by comparing the object values of specified predicate, as well as semantically observing the grammatical elements of the predicate, accurately identifying the characteristics of the object's agents and improving the similarity assessment based on them. This will connect data that is both semantic and disparate, providing basic data materials for accurate customer Bigdata analytics, which will greatly help manage customer value. Although this study aims primarily to develop a customer Bigdata-based collection model for target companies' customer value management in smart financial environments and to develop a customer Bigdata-based analysis model, the generalization process for diffusion to the technological, economic, industrial and regional (universal) range of quantitative marketing models based on customer Bigdata can be expected as a follow-up study. We can also expect to expand the industry to the same industry through this process.

5.2 Expected Effect of Research Results

The data connection method proposed in this study is a new attempt to identify and link the meaning of the data rather than just the type of data, which has the advantage of significantly increasing the level of similarity in the data connection compared to the traditional methodology by specifically dividing it into descriptive grammatical element assessment, vocabulary definition grammatical element

evaluation, and similarity level improvement. In addition, this semantic connection is attempted in detail on a case-by-case basis, and the so-called 'Message Connectivity Method', which attempts to connect data differently from the previous 'Comparison of Object Values of Specified predicates' such as SILK and LIMES, which links data based on 'LOD, Linked Open Data' led by W3C. The connectivity proposed in this study will significantly reduce omissions and distortions in customer data in collecting and analyzing customer data by significantly reducing the omission and distortion of customer data in the context-connections of customer data in the smart financial environment, which will lead to accurate customer Bigdata analysis of customer data, thereby creating an opportunity for effective use in customer value management. Analyzing and utilizing the semantically correctly coupled customer Bigdata will enable accurate decision-making of an entity's customer value management and also apply it to the development of a new business model of customer value management.

6. CONCLUSION

The meaningful connection of data through the context-connection method proposed in this study will lead to accurate customer Bigdata analysis of customer data, creating an opportunity for effective use in customer value management in smart financial environments. (1) The data connection method proposed in this study is a new attempt to identify and connect the meaning of the data, rather than just the type of data, with the advantage of being specifically divided into descriptive grammatical element evaluation, vocabulary-defining grammatical element evaluation, and similarity level improvement, resulting in a greater level of similarity in data connection than conventional methodologies. (2) The method of connection proposed in this study, by meaningfully linking customer data from an enterprise through context-connected methods, may significantly reduce omissions and distortions in customer data in the collection and analysis of customer data, which will lead to accurate customer Bigdata analysis of customer data, thereby creating an opportunity for effective use in customer value management. Analyzing and utilizing the semantically correctly coupled customer Bigdata will enable accurate decision-making of an entity's customer value management and also apply it to the development of a new business model of customer value management [26].

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