The Integrated Model Based on Big Data for Wearable Service Quality Trust

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Abstract. The traditional trust adoption problem data comes from the questionnaire survey. The accuracy and objectivity are not high, and the practical application value is limited. The output of the research is usually the subjective factors affecting trust, and the deep reasons for low user trust are not deeply explored. This study aims to propose a new set of consumer wearable service quality trust integration model based on big data, deeply integrate the two different research fields of big data mining and trust adoption, and quantitatively describe how wearable service quality characteristics, privacy environment, business characteristics, personality characteristics and other factors affect consumers' trust and adoption of wearable services.

Keywords: Wearable services · Quality trust integration · Big data

1 Introduction

Previous studies on trust adoption mostly used literature research to collect influencing factors, questionnaire survey to collect empirical data, and structural equation to test the hypothesis of the model. Although these methods are mature, they often have unstable data quality, high subjectivity, insufficient quantitative analysis and research, and the conclusions are limited. It is because of these practical needs and confusion, that this paper studies the quality trust of wearable services based on big data technology.

Based on the analysis method of big data mining, this paper integrates the theoretical methods of big data science, consumer behavior and e-commerce, carries out interdisciplinary research, deeply integrates the two different research fields of big data mining and trust adoption, and quantitatively depicts the characteristics of Wearable service quality, privacy environment, business characteristics, personality characteristics and how these characteristics affect consumers' trust and adoption of wearable services. The research results can more comprehensively and truly understand consumers' concerns and demands, help enterprises overcome the bottleneck of wearable product research and development, eliminate the uncertain factors affecting consumers' trust, enhance the competitiveness of products and services, and better meet consumers' needs. It also helps to promote the healthy development of the intelligent wearable industry of the Internet

G. Salvendy and J. Wei (Eds.): HCII 2022, LNCS 13337, pp. 211–219, 2022.
https://doi.org/10.1007/978-3-031-05014-5_17

of things in the era of big data, meet people's yearning for a better life of interconnected things, and provide reference for the government to improve relevant industrial policies. It has very important practical and theoretical significance.

2 Key Scientific Problems to Be Solved

This paper intends to solve the following key problems:

1. For model building, the key scientific problems is how to factor large data mining, it is using web crawler technology from social network, community BBS, literature, third-party source data such as database and study and so on, and then through the design of ETL data cleaning conversion, storage, calculation, design, modeling, association analysis, Several factors affecting the quality and trust of wearable services are obtained, and criteria for factor screening are established.
2. For empirical methods, the key scientific issue is how to establish a mapping relationship between big data acquisition indicators and scale measure items through the design of empirical big data acquisition indicators. And how to persuade consumers to participate in big data collection research, and develop software to collect relevant big data, after analysis and processing, transform and map into the measure value of variable measurement items in the model.
3. For cluster comparison, the key scientific issue is how to improve the clustering algorithm and establish an effective cluster model for wearable service consumers. Based on this cluster model, the target users can be clustered and grouped, and different user models can be empirically compared and analyzed.

3 Research Contents

The overall goal of this project is to quantitatively describe how factors such as wearable service quality characteristics, privacy environment, business characteristics and personality characteristics affect consumers' trust and adoption of wearable services based on big data technology. Specific sub-objectives include:

1. Explore the antecedent variables of trust in wearable services through factor big data mining.
2. Through the comprehensive trust model of wearable services, the relationship between model variables is comprehensively clarified.
3. Verify the comprehensive model of wearable services through empirical big data collection and processing and structural equation model, find the key factors affecting trust in wearable services and study the particularity of consumer behavior of wearable services.
4. Through user big data clustering, empirical comparative research is conducted on the influencing factors of user trust in different clusters, and the differences of influencing factors of trust in different clusters are found.

This paper mainly studies the following contents:

1. Construction of Wearable service quality sub model: from the perspective of service quality characteristics, through web crawler technology and factor big data mining, combined with literature research, collect factors affecting Wearable service quality, mine antecedent variables, identify Wearable service quality characteristics, and construct Wearable service quality sub model.
2. Construction of Wearable service quality trust integration model: Based on UTAUT2 (technology adoption and utilization integration theory) theoretical model, on the basis of e-commerce and mobile commerce trust model, the Wearable service quality sub model is integrated, and the Wearable service quality trust integration model is constructed by integrating privacy environment, business characteristics, personality characteristics and other factors [1].
3. Empirical research method design: according to the trust integration model of Wearable service quality, a comprehensive scale and measurement items are designed. Then, through the empirical big data collection index design, a mapping relationship is established between the big data collection index and the measurement items of the scale.
4. Empirical big data analysis: develop Wearable service application data collection software, formulate big data collection rules, collect big data of contracted users and process relevant big data.
5. Construction of user big data clustering model and algorithm improvement: by improving the clustering algorithm based on adaptive chaotic particle swarm optimization, combined with consumer characteristic big data, a wearable service consumer clustering model is established. According to this clustering model, the target users are clustered.
6. Empirical comparative study on grouped users: using SEM, this paper makes an empirical analysis on the integration model and different grouped user models, so as to find the key factors affecting Wearable Service trust, the particularity of Wearable service consumer behavior and the differences of influencing factors of different cluster trust, analyze the reasons and put forward countermeasures.

4 Research Method

Firstly, in the model construction stage, based on factor big data mining, web crawler technology, questionnaire survey, literature research and other methods, explore and collect some factors affecting the trust of wearable services; By analyzing the comprehensive factors affecting Wearable Service trust, this paper constructs a wearable service quality trust integration model. Secondly, in the model verification stage, through the empirical big data collection index design and mapping with the antecedent variable measure of Wearable Service trust, and then through the development of Wearable service application data collection software, collect the big data of contracted users and analyze and process the relevant big data. Finally, in the segment of clustering and comparison, the user big data mining, clustering and empirical comparative analysis based on consumer characteristics are carried out.

Specific research methods include:

1. Factor big data mining: Based on Python web crawler technology, from social networks, community forums, literature, third-party databases and research reports, through data collection, ETL data cleaning and conversion, storage design, computing design, mining modeling and association analysis, we get the factors that affect the trust of wearable services [1].
2. Empirical big data analysis: through the design of empirical big data collection indicators and mapping with the measurement items of antecedent variables of Wearable Service trust, and then through the development of Wearable service application data collection software, collect the big data of contracted users, analyze and process relevant big data, and convert it into questionnaire measurement value [2].
3. User big data mining: by improving the clustering algorithm based on adaptive chaotic particle swarm optimization and combined with consumer characteristic big data, a wearable service consumer clustering model is established. Cluster the target consumers according to the model [3, 4].
4. Model integration method: according to the factor big data mining results and literature research [5–7], starting from the characteristics of Wearable service quality, the sub model of Wearable service quality is constructed by exploring the antecedent variables of Wearable service quality. At the same time, based on the UTAUT2 theoretical model, on the basis of e-commerce and mobile commerce trust model, combined with the service quality sub model, this paper constructs a wearable service quality trust integration model.
5. The model verification method mainly adopts big data clustering, questionnaire survey, structural equation model and statistical analysis. According to the big data mining results of users, the target consumers are grouped. Then, using SEM structural equation, this paper makes an empirical analysis on different cluster users, so as to find various factors affecting Wearable Service trust, the particularity of Wearable service consumer behavior and the differences of influencing factors of different cluster trust, analyze the reasons and put forward countermeasures [8–10].

5 Construction of Integration Model

The integration model studied in this paper is shown in Fig. 1.

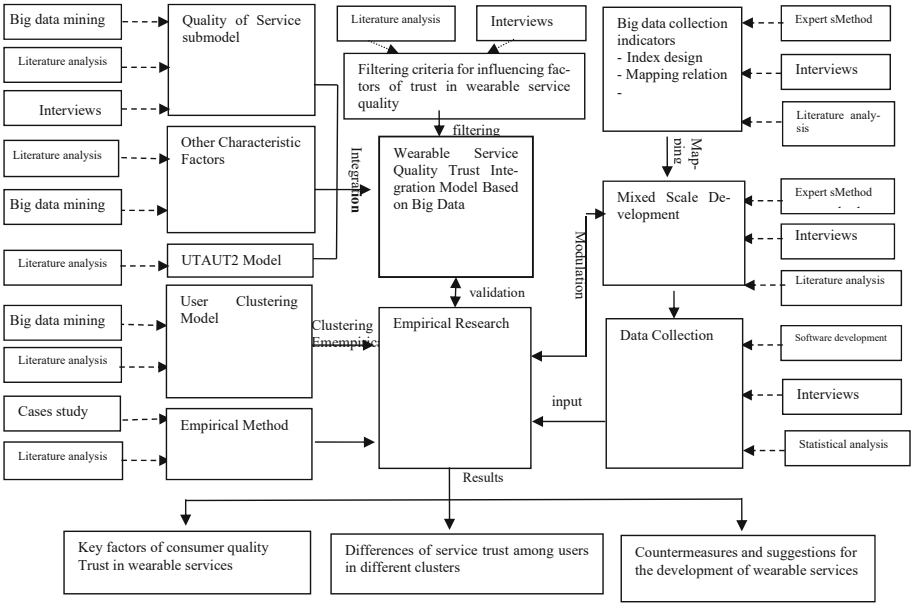

Fig. 1. Structure diagram of wearable service quality trust integration model based on big data

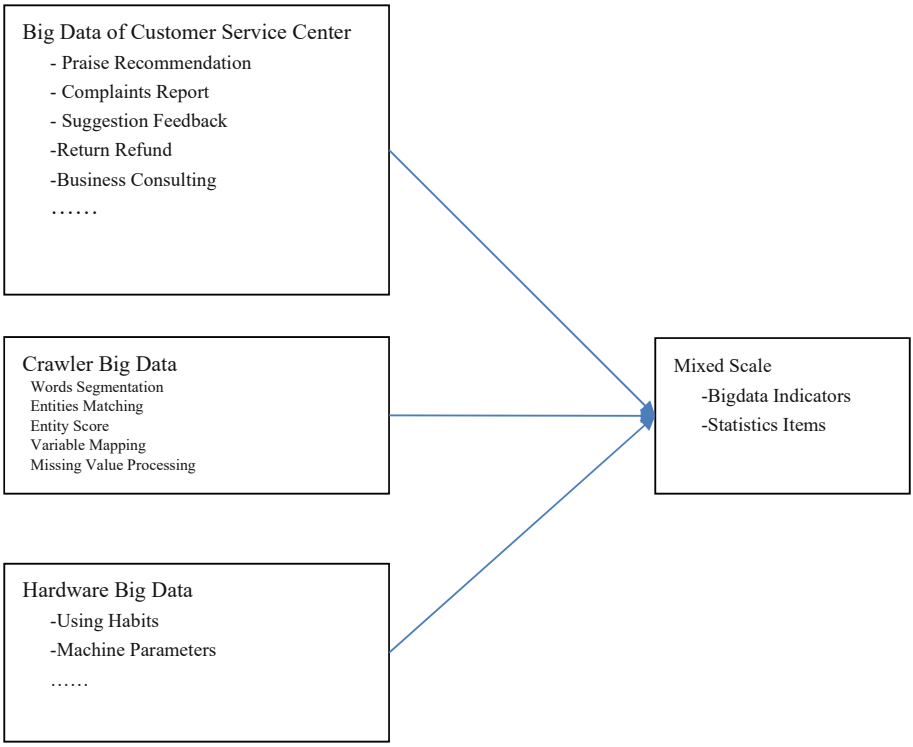

Fig. 2. Mapping relations [1]

The integration model is composed of sub-models:

1. Wearable service quality sub model: explore the antecedent variables of Wearable service quality sub model and build the model with the help of factor big data mining, literature analysis, research and interview. These antecedent variables may come from wearability (durability, comfort, aesthetics, endurance, size), functionality (health, sports, safety, payment, entertainment), personalization (differentiation, intelligence, customization), integration (connection, interaction, control), etc.
2. Collection of other characteristic factors: with the help of factor literature analysis and big data mining, the factors affecting consumers' trust in wearable services may come from business characteristics (business reputation, business scale), personality factors (privacy concerns, trust tendency, security concerns), environmental characteristics (structural guarantee, privacy policy), etc.
3. UTAUT2 model: technology adoption and utilization integration theory (UTAUT2) is an extension of UTAUT (eg.Unified Theory Of Acceptance And Use Of Technology). In the UTAUT model, there are four factors that play a decisive role in consumers' technology acceptance and use behavior, namely performance expectation, effort expectation, social impact and convenience. Based on the four factors, UTAUT2 adds three new factors: hedonic motivation, price value and habit. In the empirical research, it is proved that the new three factors play an important role in consumer trust and new technology adoption. As the latest technology adoption theory, UTAUT2 has strong conviction in explaining the new business system.
4. Screening criteria for influencing factors of Wearable Service Trust: after factor big data mining, literature analysis and model integration, there are many factors entering the integration model, so it is necessary to study a factor screening criteria. This part will screen candidate variables into the integration model on the basis of expert interviews and literature research.
5. Construction of Wearable service quality trust integration model: after screening, the Wearable service quality trust integration model is constructed from seven factors of UTAUT2 theoretical model, several factors of Wearable service quality sub model, environmental characteristics, business characteristics, personality characteristics and other factors.
6. Big data acquisition index design: the design of big data acquisition index should meet the technical feasibility and implementation feasibility. After a long period of big data collection, it is necessary to dynamically adjust the index value to meet the requirements of the measurement item mapping rules in the mixed scale.
7. Mixed scale development: not all questionnaire measurement items can be mapped by big data measurement indicators. A small number of items that cannot be mapped need to be collected by traditional questionnaire or wearable devices based questionnaire. Therefore, the final comprehensive scale mixes big data measurement items with questionnaire items.
8. Data collection: through the development of data collection software app and the solicitation of contracted users, the big data of key indicators in the use process of wearable services are collected, which are transformed into questionnaire measurement values after big data analysis and processing.

9. Construction of user clustering model: firstly, starting from the resource dimension and motivation dimension of VALSTM model, combined with demographic and psychological characteristics, this paper constructs a wearable service consumer clustering model. In order to obtain better clustering effect, the clustering algorithm based on adaptive chaotic particle swarm optimization effectively integrates the fuzzy mean clustering and the improved PSO algorithm, which avoids the defects of the original fuzzy mean clustering algorithm, such as weak self adaptability, easy to fall into local minimum and unsatisfactory clustering effect.
10. Traditional empirical method: structural equation model is a method to establish, estimate and test causality model. The model contains both observable explicit variables and potential variables that cannot be observed directly. Structural equation model can replace multiple regression, path analysis, factor analysis, covariance analysis and other methods to clearly analyze the role of single indicators on the whole and the relationship between single indicators. Through structural equation multi group analysis, we can understand whether the relationship of variables in different groups remains unchanged and whether the mean value of each factor is significantly different.
11. Empirical research: to do empirical analysis with the help of structural equation model, we must first prepare the data and collect the appropriate amount of sample data. It is generally believed that the maximum likelihood estimation (MLE) is suitable for estimating the structural equation when the number of samples is at least 100, then reliability analysis and validity analysis are carried out, and finally the fitting degree of the model is evaluated. After the transformation of big data acquisition index data, this paper meets the requirements of structural equation model. Therefore, the integration model and different cluster user models are empirically analyzed by using structural equation.
12. Research results: through the comprehensive research of this paper, we can find the key factors affecting the trust of wearable services, the particularity of consumer behavior of wearable services and the differences of influencing factors of trust in different clusters, analyze the reasons and put forward countermeasures.

Figure 2 shows how to map metrics based on big data into variables that the model can handle.

6 Discussion and Conclusion

Big data technology is different from traditional statistical methods. Big data studies massive "overall data" and is no longer confined to accurate statistical "small data". At the same time, big data analysis does not pursue causality like statistics, but focuses on correlation. It is a beneficial attempt to study the trust of wearable services based on big data thought, big data thought, big data technology and methods.

The specific features and innovations of this paper lie in the innovation of research methods and model integration, including the following aspects:

1. In terms of research perspectives and research methods, based on the perspective of big data, this topic adopts big data related technologies to expand the research

methodology of trust. In terms of specific big data application, it has successively adopted technologies such as factor big data mining, empirical big data collection and user big data clustering. Firstly, based on factor big data mining and web crawler technology, this paper explores and collects several factors affecting the trust of wearable services. Secondly, through the empirical big data collection index design, and mapping with the antecedent variable measure of Wearable Service trust, and then through the development of Wearable service application data collection software, collect the big data of contracted users and analyze and process the relevant big data. Finally, in the empirical part, the user big data mining and clustering based on consumer characteristics are also carried out.

2. In the aspect of model construction, starting from the characteristics of Wearable service quality, the sub model of Wearable service quality is constructed by exploring the antecedent variables of Wearable service quality. At the same time, based on the theoretical model of UTAUT2 (technology adoption and utilization integration theory), based on the trust model of e-commerce and mobile commerce, integrate the sub model of service quality and construct the trust integration model of Wearable service quality, which has more comprehensive research value of trust factors.
3. In the aspect of empirical analysis, by improving the clustering algorithm based on adaptive chaotic particle swarm optimization and combining the big data of consumer characteristics, a wearable service user clustering model is established. According to this clustering model, the target consumers are grouped. Then, using SEM structural equation, this paper makes an empirical analysis on different cluster users, so as to find various factors affecting Wearable Service trust, the particularity of Wearable service consumer behavior and the differences of influencing factors of different cluster trust, analyze the reasons and put forward countermeasures.

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