The Research on User Perception Monitoring Technology

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Abstract. With the background of "Internet +" action plan and construction of smart grid, the multi-dimensional electronic service channel should provide the grid service for the user's demand in the mobile Internet era. In this paper, the search of user perception monitoring technology in multi-dimensional electronic service channels was studied from the server and the mobile two parts respectively. Improving the existing monitoring system problems which lag than the best technology of this area and forming test indicators to the establish user perception assessment system. It provides the technical basis for supporting the application supervision mode that is perceived for users.

1. Introduction

As Premier Li Keqiang proposed in the 2015 government work report that the “Internet +” action plan and construction of smart grid, the multi-dimensional electronic service channel should provide the grid service for the user's demand in the mobile Internet era. In this paper, the search of user perception monitoring technology in multi-dimensional electronic service channels was studied from the server and the mobile two parts respectively. Improving the existing monitoring system problems which lag than the best technology of this area and forming test indicators to the establish user perception assessment system. It provides the technical basis for supporting the application supervision mode that is perceived for users.

At present, the optimization exploration of user perception has been practiced in the network and communication fields [2] [3]. Therefore, in the era of mobile Internet, strengthening the supervision of multidimensional electronic channel services to meet the needs of users is an effective way to improve the user experience and improve the efficiency of the State Grid marketing electronic channel services. At the same time, we can establish a good brand image of the State Grid Corporation and enhance the core competitiveness of the State Grid's Internet services.

This article focuses on marketing multidimensional electronic service channel supervision model and user perception [4] monitoring technology in the field of power marketing applications, based on
big data analysis to extract key indicators of electronic service channels to establish a unified Internet user service system.

2. Situation Analysis
The "Internet +" program has been effectively implemented in the construction of the smart grid, especially in the multi-dimensional construction of the electronic service channel for marketing. At present, 95598 intelligent interactive platform, State Grid Mall, Hand at Power, 95598-Pay, e-charging and other service platforms have been established to provide users with multiple service channels to implement the "Internet +"Action Plan. However, the construction process of multi-dimensional electronic channels also shows that the company's terminal information operation and maintenance work is backward, application monitoring is basically a passive response, there are many hidden security problems, and problems can not be solved in time. Therefore, the improvement of the operational monitoring service architecture model for the problems existing in the multi-dimensional electronic channel focuses on the following aspects:

(1) Improve user experience
The multi-dimensional electronic service channel should maintain the overall interface style, provide users with simple and clear business operation procedures and introduction instructions, online help, etc. to reduce the learning cost when users use, thereby improving user efficiency.

(2) Improve user behavior information analysis ability
Form an effective analysis mechanism for user behavior data and user appeal information, and form user perception factors and formulate user perception indicators. The outlier evaluation method is used to evaluate the user's perceived indicators to further differentiate the user categories. At the same time, the user's service usage and the usage habits of each channel are comprehensively analyzed to improve the user's use of services.

(3) Improve marketing business promotion
According to the collected user behavior data and appeal information, the big data analysis is used as a guide to provide users with personalized information push and marketing services, improve the quality of electronic service channel content, and improve user perceived satisfaction.

3. Server-side monitoring technology solution
At present, the multi-dimensional electronic channel service platform package is mainly divided into a mobile application and a website platform. Different platforms have different influences on user perception, and user perception factors are also different. Therefore, for the website electronic service platform adopts the micro-service technology architecture [5], the specific form also has the traditional single server + single service transformed into multiple servers + multiple services. The objectives of monitoring also include:

(1) Accident warning: Set the threshold. If an event exceeds the threshold, it will trigger an alarm in time.

(2) Fault location: The system has a fault, and the abnormal log location fault is collected by static point.

(3) Optimization decision: make decision analysis on the collected user behavior data, and improve the optimization experience in time.

The above monitoring target firstly collects data. In the micro service architecture mode, it mainly includes micro service log collection scenarios, user behavior data analysis decision scenarios, and system performance tracking scenarios.

3.1. Microservice Log Collection Scenario
The main idea of log collection based on microservices[6] is to collect all the logs together. The basic process is shown in Figure 1:
First, the logs are collected from each host server and the log data is transmitted through the pipeline. The logs are offloaded according to different requirements, which is implemented by ELK technology. At the same time, in this paper, the storage system adopts the Hadoop framework, and the real-time analysis system adopts the Storm framework. Microservice log collection the advantage of the above architecture is its scalability. The pipeline in the architecture not only has the transmission function, but also can be pre-processed and data buffered according to the requirements, and can be hierarchically processed according to the amount of data during transmission. Problems that are easily caused when log data is aggregated. In addition, through the analysis of the industry log collection technology, it is found that the collection of different agents for the service log, the container log, and the service host log increases the complexity. Therefore, the system log collection is performed in a unified manner.

3.2. User Behavior Data Analysis Decision Scenario
User behavior data collection is carried out by means of buried points, and behavior data is analyzed and determined by outlier evaluation techniques. The way to bury the point under the Web platform is divided into two parts: the front end and the server side. The front-end burying point eliminates the complicated practice of inserting custom code everywhere, but uses the selenium framework for burying. The buried point in the backend is implemented in the Java Metrics framework.

3.3. System performance tracking scenario
The remaining system performance monitoring of the microservice is similar to that of the traditional architecture. The CPU, memory, IO, etc. of the system are collected by the protocol and stored in the indicator library. InfluxDB was chosen as the backend storage for the selection of the indicator library considering the memory capacity.

4. Mobile monitoring
In the era of mobile Internet, the impact of user experience is crucial. Mobile applications play an important role in the construction of multi-dimensional electronic service channels in the State Grid. Therefore, monitoring of mobile applications is directly related to user perceived satisfaction. In the research of this paper, it is divided into two parts: interactive monitoring and application performance monitoring. The interaction monitoring mainly focuses on the page loading time and the interaction trace of the page. Performance monitoring includes crashes, network requests, interface stagnation, traffic consumption, and more. The page interaction traces are mainly user behavior collection, and the mobile terminal uses the non-buried point technology to achieve. Based on the user's perceived importance, the above content can be abstracted into monitoring indicators related to user perception, including Crash analysis, Abort rate, FPS monitoring, Page Load Time, network monitoring, and traffic monitoring.

(1) Crash analysis
Application crashes are a bad experience for users, so collecting crash logs and stacks when the Crash log application flashbacks, application version information, system version information, phone model and other information can analyze the cause of the crash from multiple dimensions. At present, all major apps will establish a crash log collection system. The research in this paper also establishes an application crash log collection system to cope with the Crash problem of multiple Apps in the
multi-dimensional electronic service channel of the national network for marketing. Figure 2 shows the crash information statistics of the App.

Figure 2 Crash chart

(2) Abort rate detection

The reason for Abort is mainly caused by excessive memory usage, which is killed by the system, and the Abort case cannot be effectively detected. The study in this paper uses the abort detection method to detect problems when sending Abort crashes. The specific details are: when the App program starts, set a flag bit to 1; when the App exits normally or detects a regular Crash, the flag of the clear setting is 0. When the app is started next time, if the flag bit is 1, it means that the last App is a normal exit, so the app will be aborted.

(3) FPS monitoring

To maintain smooth page interaction, the APP refresh rate should be kept at 60fps. The implementation principle of the Carton monitoring is to calculate the current FPS by recording the refresh interval, and the FPS can be used to determine whether the App is stuck. However, according to the survey of current industry programs, it is very difficult to directly use FPS to monitor the interface when it is prone to jitter. To this end, the study in this paper uses a strategy that triggers Carton monitoring when the number of occurrences of a carton exceeds N times in a period of time. When it is determined that App Caton occurs, the stack data is captured for reporting to solve the problem.

(4) Page Load Time

App page loading contains many operations such as initialization, network request data, database read and write, image loading, and layout. Any problem with one operation will affect the page load time. Figure 4 shows the velocity measurement model for page load time in this study, which is divided into four phase time tests. Set the corresponding API for each app's page through the configuration file, and bury the point in the API request, so that the problem can be timely located when the problem occurs.

Figure 3 page loading speed model diagram
(5) Traffic monitoring
Users are more sensitive to traffic when using it for mobile apps. Therefore, this paper studies the statistics traffic on the App side, mainly including the two sources of request source and network type. The specific process is to register the NSURLProtocol and the Aspectj-based AOP method to intercept the network request API to implement traffic statistics in iOS and Android applications.

(6) Network monitoring
During the use of mobile applications, requests for errors, requests being hijacked, etc. seriously affect the user experience and user information security. Therefore, it is necessary to timely monitor the network performance monitoring of the application in response to unexpected problems. In order to monitor the application of the application in the real network environment and optimize the experience, this paper uses network monitoring without burying technology. The fishhook injection technology is used to monitor the network performance of the application, and the fishhook technology is used instead of the specific implementation of the function in the dynamic link library.

5. Summary
Based on the needs of multi-user electronic service channel user perception monitoring, this paper studies the related technologies of user perception monitoring under multi-dimensional electronic channel platform. The design ideas and implementation of user-aware monitoring are introduced in detail from the server and mobile. By collecting user behavior data, collecting user appeal information and analyzing it to form user perception, a user perception evaluation system is established by setting up user perception indicators using outlier evaluation techniques. The research in this paper effectively solves the problems of monitoring lag and passive response in the past, and improves the working efficiency of operation and maintenance workers. At the same time, it provides a technical basis for supporting the application-oriented supervision model.

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