Analysis of Innovation and Optimization of Mobile Application Software Development Model in the Context of Big Data

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Abstract

With the rapid development of the current network information technology, mobile application software users increased year by year, effectively promoting the development of mobile services and software development and accelerating the early arrival of big data age. With the massive data, mobile application software development enterprises and service operators achieve a qualitative leap in the quality of products and services, entering a new stage of rapid development. However, in the process, the big data background has brought many development opportunities accompanied by the corresponding problems and challenges. The most prominent question is how to really ensure that mobile applications can meet the growing diverse needs of users. In this paper, in the context of big data, this paper analyzes the current situation of mobile application software development, and puts forward construction of the integration data model and the integration data model design, by proposing the construction path for the innovative mobile software development model. On such basis, it builds an optimization model of the software development model, in order to improve the efficiency and quality of software development. Thus it can provide users with more quality products and services, in order to promote the in-depth development of the use of mobile networks and software development enterprises.

Keywords: Big Data, Mobile Application Software, Status Quo, Innovation, Optimization Model.

1. RESEARCH BACKGROUND

1.1 Literature review

In recent years, with the rapid development of China’s mobile communications industry, the major mobile application software developers and operators have entered a new period of development. Especially in the context of big data, it has launched a variety of application softwares, effectively expanding the market space of mobile communications industry with a wider coverage a growing number of users, which brings many development opportunities for the major software developers (Ning and Feng, 2016). However, at the same time, technological updates and upgrades put forward higher requirements on the software development model, and it thus exposes many urgent problems to be solved. Mobile application software developers have improved the up to more than 40 production lines with modern varieties and perfect system from several products of the initial development. The related enterprises’ the internal development process still adopt the traditional development model, and the scale of expansion is only a simple repeat of the development process. First, the product is made in accordance with their specific research and business assessment of the market. Second, the market will transfer these products to the research and development department for actual production. Finally, the research and development department will independently develop the products according to the market needs, and connect the mobile operation network independently to provide the corresponding products and services for the users (Cheng and Zhong, 2016). Each product is a single and relatively independent development process based on the user and the demands, to provide specific software services with the backstage system connecting to the mobile operating network. But in this process, the product in the middle stage from the market research to delivering service, the user's basic information has undergone varying degrees of changes. Thus the original service will produce some changes. If the developer cannot find out and effectively solve a series of problems caused by it, it will inevitably lead to the loss of resources and waste. Therefore, for mobile application developers, in the current context of big data, it needs to ensure their own sustainable development by actively taking the initiative to grasp and master the increasingly complex structure, changing needs, massive data information as well as the dynamic development of...
the mobile operator system and other aspects. Only a comprehensive understanding of the current market situation and a clear idea of their own deficiencies can develop and choose a more quality and perfect development model.

1.2 Research purpose

In order to effectively promote the actual development of software development within the enterprise, to deal with the gradual growth of social user demands and changing interfaces of cooperation and other issues. It should allow enterprises to adapt to the changing environment. It should innovate based on the upgrading of the needs, in order to effectively shorten the software development time, to reduce development costs and to improve service quality (Zhuang and Zhang, 2013). In order to achieve this goal, based on the background of big data, this paper carries out in-depth analysis of the current situation of mobile application software development and sums up the existence of a single system structure, inadequate software data independence and other issues. It further proposes the model architecture ideas and specific methods of the innovative software development model, with the use of the new concept of integration model, in order to better meet the different needs of users with the integration of existing enterprise resources. Thus it can improve overall efficiency and reform the original service model. It can also reduce the duplication of enterprises’ development and waste. Enabling new models of enterprises’ internal software modeling services can make enterprise business processes more efficient and more competitive.

2. DEVELOPMENT OF MOBILE APPLICATIONS IN THE CONTEXT OF BIG DATA

2.1 Single system structure

It should build a relatively comprehensive structure of the software system by breaking the restrictions of traditional single re-development model, in order to meet the market changes of the mobile business situation with a faster speed (Wei and Lin, 2013). However, in the current context of big data, the mobile application software product structure is too single, as the details shown in Figure 1.

Figure 1.Current Software Product Structure

Figure 1 shows that in the current software development model the business processes of mobile application software is a top-down development process from software products to delivering services. The various departments engaged in the products are always working around the product. This different product system contains its own previous data and development modules, but these business ‘systems are the planning and research and development based on the enterprises’ specific product needs. Now they are independent of each other (Guo and Xiong, 2012). It needs to achieve the development of new products and at the same time integrate the various systems under the product line on the current platform. In practice, developers usually have a certain degree of contradiction in the connections between the costs and the results of the integration development thinking. It needs to support a wide range of products, to improve the business process, to enhance the standardization process and automation capabilities of the platform and architecture system, and to enhance the system’s real-time processing capabilities with a relatively unified system (Cai and Yan, 2014).

2.2 Software data independence

If it further refines the data from the middle department of software products, it needs to sort out the operation data of the various modules in a unified manner. And then it starts a comprehensive analysis to work out the current software data structure as shown in Figure 2 in details.
According to the relational structure shown in Figure 2, it shows how the number of developers’ products is increasing. The data of each product has strong analytical value, and it selects and analyzes the most valuable information. Thus it further proposes to construct a rapid collaborative development platform conducive to the construction and adjustment of the system model, the effective sharing of information between the relevant systems, and suitable for enterprise software system construction (Zhong and Zhang, 2014). It needs to effectively use this information to the greatest benefits and promote a progressive formation of a reasonable data model based on the system and business modules, optimizing the service process to avoid and reduce the future repetitive construction of the software. The new enterprise software development model based on collaborative software support module, data statistics and data analysis. Its core standard lies in the unique facts within the enterprise with the data base as the basic criteria.

3. INNOVATION MODEL ARCHITECTURE OF MOBILE APPLICATION SOFTWARE DEVELOPMENT MODEL IN THE CONTEXT OF BIG DATA

3.1 User information integration model

The user information integration model mainly deals with the user-specific information about the business, such as the user’s personal information, the customized information of the individualized products, the software design ability, the user’s use right and access and the like. The unique business model is based on the integration model, in order to provide specific software to adapt to different context model support, including user networks, user hobbies, user mobile terminal environment and the like with the information model (Zhang, 2016). The integration model and isomerization can fully meet the diversification of the construction model approach. The provision of business from user unified information model needs to match the system hobbies, network and terminal capabilities, application requirements and the like. The matching requires the use of semantic techniques to regulate the representations and definitions of information, inorder to support context-based decisions and adaptation. Traditional processing model of software product is shown in Figure 3.

![Figure 3: Traditional Processing Model of Software Product](image)

In the above software, different products have different information and this information overlaps, which is bad for development and maintenance. Especially, when there is occurrence of the relationship and exchange and use between the two products, it cannot really ensure that the user information is exactly the same. However, the use of user information integration model can transform the relation into the new structure shown in Figure 4.
With a unified model of unified user information, all of the company’s products use the same set of product model services. Model information, extended information and exclusive information are for their respective duties as defined by the integration. Regardless of any changes of the model information in the production of the products, it only needs a unified change, management and maintenance for one model and interface (Chen, 2015). One-time updating can benefit all products based on the same model, consistent information and interface services. It can provide a good support for the old product updating and the development of new products. Data model establishment process is based on the collection of comprehensive business information and a comprehensive the process of comprehensive choice of the final product information. The final data model provides the unified data format of the company’s software as the global business support before and in the future. The expansion of information is the product line information, related to the corresponding product line. The new software can choose to use such service or not. Separation software specific information is only related to a single product with a record within the software, providing no services and information for the outside.

3.2 Integration model of software features

The integration model of the software feature is a newly constructed model, with the unified management of the main application and the software information. The model will become the identification of all enterprises in the system (Zhang, 2015). All software has such a relatively independent module as an important part of the overall identification system for related products. The company’s software with the integration model of product features can first increase the management function company’s products. In the software application system, the external third-party partners or internal business departments can check out the products and services through the integration model of product characteristics on the service platform of the system (Guo, 2016). It will run through the enterprise product registration, product search, and system design of product service system. The integration of the registration service can provide users with the model and the product services of the corresponding model, in order to improve service quality of product.

3.3 Integration model of software services

Developers also provide services when accepting the service of China Mobile, China unicom, China Telecom and other mobile operators. The integration system service model aims for the unity of the external service platform. First, there are some divisions in the external service divided into three categories respectively. The first category is for the direct user services; the second category for third-party partner services, such as mobile terminal manufacturers, game services provider partners, Internet payments service providers and other business services providers; the third category is the company’s internal modules of the communication services. For third-party co-operators, the system should provide their service corresponding to the development methods based on the requirements of the partners. But the server is to provide the same business, and the service providers also provide more similar payment business (Duan, 2017). Therefore, it needs to use integration service model.

The benefits of such method only needs one development model, and all the development and the integration development and maintenance systematically reduce the development and maintenance costs, in order to meet the needs of a third party diversification and achieve the unity of the interface (Gong, 2015).
4. OPTIMIZATION MODEL CONSTRUCTION OF MOBILE APPLICATION SOFTWARE DEVELOPMENT MODEL IN THE CONTEXT OF BIG DATA BACKGROUND

4.1 Optimization model overview

Based on the characteristics of mobile application software and its development model, this paper adopts Capability Maturity Model Integration (CMMI) model to improve and optimize its development model in all directions. The CMMI model is also known as the software maturity model, which is a comprehensive professional model for real-time monitoring and management of the software development project process. The continuous optimization level can ensure the final success of the individual project with satisfying duration, cost and the like (Meng, 2013). However, companies always have higher pursuit, such as the products of greater quality, shorter construction duration, lower cost and the like. The continuous optimization level focuses on continuous improvement in process performance. At this level, the software organization can spontaneously identify the root causes of the current process flaws and continually improve the process on this basis, often resulting in revolutionary performance improvement. The goal of resolving them is to achieve predictability in the statistical sense consistent with previous process performance, and to search for common causes that hinder the improvement of process performance. The goal is to fundamentally improve the process performance.

4.2 Specific steps of optimization

The development process in the software development is both related to the design capabilities, professional ability, the user experience, the actual needs and many other factors of the overall development team. Based on this, combined with all the functions of the CMMI optimization level, this paper uses multiple linear regression method for real-time monitoring and management of mobile application software development process. Assuming that one of the dependent variables a is affected by the number of f independent variables, the observations of n group is \((a_i, b_{1i}, b_{2i}, ..., b_{fi})\), among which, \(x=1, 2, ..., n\). Then the structure model of multiple linear regression is written as:

\[
a_x = \delta_0 + \delta_1 b_{1x} + \delta_2 b_{2x} + \cdots + \delta_f b_{fx} + l_x
\]  

(1)

Among it, \(\delta_0, \delta_1, \delta_2, ..., \delta_f\) is the parameter to be determined. \(l_x\) is for random variable. If \(y_1, y_2, ..., y_f\) is the fitted value of \(\delta_0, \delta_1, \delta_2, ..., \delta_f\), then the regression equation is written as:

\[
\hat{a} = y_0 + y_1 b_1 + y_2 b_2 + \cdots + y_f b_f.
\]  

(2)

Among it, \(y_0\) is a constant, and \(y_1, y_2, ..., y_f\) is called as the partial regression coefficient (Zhang, 2012). The significance of the partial regression coefficient \(y_i (i=1, 2, ..., f)\) is the average change in number value of the factor variable \(a\) due to every one unit change of the independent variable \(b_i\) when the other independent variables \(b_j (j\neq i)\) are fixed.

According to the principle of least squares, the estimated value \(\hat{y}_i (i=1, 2, ..., f)\) of \(\delta_i (i=1, 2, ..., f)\) should comply with

\[
W = \sum_{x=1}^{n}(a_x - \hat{a})^2 = \sum_{x=1}^{n}[a_x - (y_0 + y_1 b_{1x} + y_2 b_{2x} + \cdots + y_f b_{fx})]^2 \rightarrow \text{min}.
\]

With the necessary condition of extremum, it has

\[
\begin{align*}
\frac{\partial W}{\partial y_0} &= -2 \sum_{x=1}^{n}(b_x - \hat{b}_x) = 0 \\
\frac{\partial W}{\partial y_j} &= -2 \sum_{x=1}^{n}(b_0 - \hat{b}_x)a_x = 0 (j = 1, 2, ..., f)
\end{align*}
\]  

(3)

In the study of multiple linear regression, the regression sum of square represents the total effect of the number of \(f\) independent variables on the variation of \(a\), which can be calculated according to the following formula:

\[
R = \sum_{x=1}^{n} (\hat{a}_x - \bar{a})^2 = \sum_{i=1}^{f} y_i G_{ib}.
\]  

(4)
While residual sum of squares is written as:

\[ W = \sum_{x=1}^{n}(b_x - \hat{b}_x)^2 = G_{bb} - R \quad (5) \]

In addition, in the study of multiple linear regressions, all the sum of squares and degrees of freedom are different to some extent. The degree of freedom of the regression sum of squares \( R \) is equal to the number \( f \) of the independent variable, and the degree of freedom of the residual sum of squares is equal to \( n-f-1 \). Therefore, the final calculated \( K \) is written as

\[ K = \frac{R/f}{W/(n-f-1)} \quad (6) \]

When the statistic volume \( K \) is calculated with the result, it is possible to test and optimize the model of the distribution table of \( K \).

5. CONCLUSION

In the context of big data, although it provides advanced technology support for the development of mobile applications, expands broader development space, it has brought new challenges and problems for the development model, which puts forward higher requirements. In this regard, mobile application software developers should carry out a comprehensive analysis regarding their current development model, summing up the problems and deficiencies. It needs to effectively use the powerful data technology, to revolutionize the development model with the planning of modernized development model, and to actively use integration thinking for the structure of integration model of user information, integration model of software product features and integration model of software system services. At the same time, it should use the CMMI model to monitor and manage the software development process in order to improve the relevant links and optimize the details, in order to meet the diversified needs of users, to provide users with more quality software application experience and service, which can effectively reduce the cost spending of developers and effectively improve the overall development efficiency and quality, in order to achieve sustainable development.

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