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PUBLIC ACCEPTANCE SITUATION AND PROMOTING STRATEGIES EMPIRICAL ANALYSIS ON THE LOCAL E-GOVERNMENT PUBLIC SERVICES

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ABSTRACT

With the development of computer science and information technology, and the development of Internet technology, the network is gradually increased in people's popularity rate, local government is in order to expand the efforts of public acceptance, and also open a local e-government public services. This paper firstly analyzes the e-government public service model, to analyze of local e-government public services from the web, mobile phone and multimedia and other aspects. Through the form of web site click rate and population survey questionnaire, using the linear variable analysis theory, to carry out mathematical statistical analysis for data, and then through the residual optimization method, to optimize the processing for data, and removing the site click rate of repetitive clicks or abnormal click and subjective factors of the questionnaire cause data error, the establishment of local e-government public service' public acceptance of mathematical model, finally to put forward the strategy that can provides theory reference for the local e-government public service.

Keywords: *E-government, Public Service, Public Acceptance, Linear Optimization; Residual Error, Mathematical Model*

1. INTRODUCTION

The 21st century is a period of rapid development of electronic information, such as television multimedia, mobile phone, Internet and other the popularity of the information carrier, public gradually increases public information' receiving capacity, and accepting mode is also gradually extended. Local governments also use these electron carriers to carry out e-government public service, and receive very good results. E-government services have high efficiency handle affairs fast advantage, which are gradually being accepted by people, there are broad development prospects [1]. Based on this, this paper investigates and analyses the form of e-government public service, to analyze the electronic government affairs service mode from multimedia TV, mobile phone and Internet three aspects, and to give concrete proportion. The site click rate and the questionnaire carry out linear variable analysis on the acceptance of local e-government public service public, through the residual optimization method, to carry out optimization on data, and then to put forward push strategy of e-government public service through the obtained data [2].

At present, the e-government public service mode basically has three kinds that are respectively multimedia TV, Internet and mobile phone models, and figure 1 shows various patterns in the role of electronic public service [3]:

(1) Multimedia television

Multimedia television mainly carries out government affairs and the theme publicity for e-government services, for example to transfer various regional governments through the congress information; and to undertake public theme through the promotion of the health city and other activities. Television multimedia is people use the maximum information carrier, the use of its can play a big role for the e-government or propaganda part.

(2) Internet

The Internet establishes interactive services between local e-government public service and populace, such as the information opening can make populace put forward issues that are answered by the government staff, and also can handle the relevant procedures as well as proven in the Internet that are the most commonly used mode in the e-government public service, local government can through the Internet on people published in time, Internet is a lot of information carrier, people can through the press and media

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to carry out real-time understanding on the local government, which is the most acceptable way of electronic government services.

(3) Mobile phone

Mobile phone is also most commonly used local e-government services, by telephone, local governments can timely detect public feelings, and however people also can by telephone to the local government to carry out consultation and seek help, mobile phone is very good with an interactive electronic government service platform.

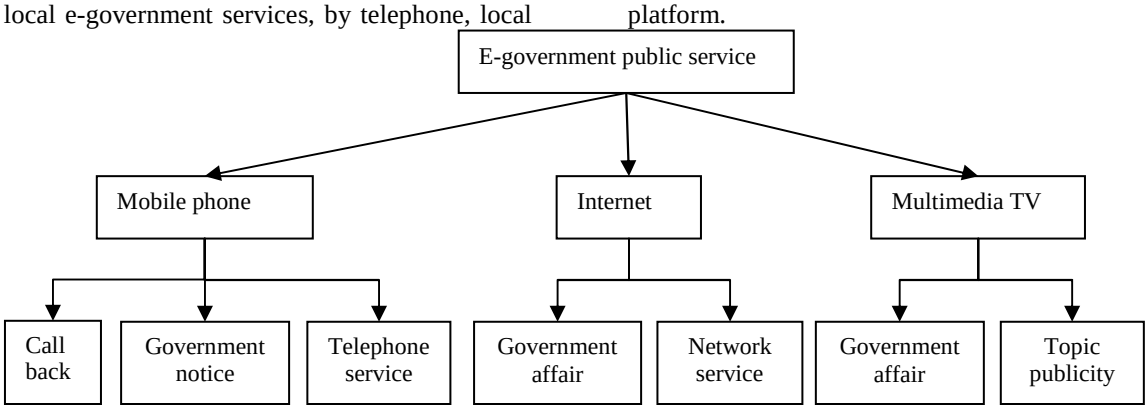

Figure 1: E-Government Service Mode

To respectively introduce three kinds of e-government service mode [5,6]:

Through the investigation and analysis, three service modes use proportion as shown in Figure 2.

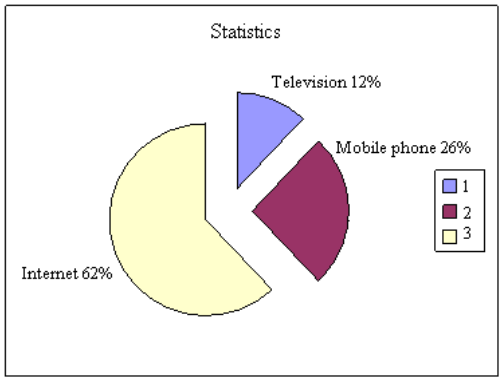

Figure 2: The Use Of E-Government Proportion Statistics

In Figure 2, it can be seen that Internet usage rate is relatively high, because the Internet information contains large quantities, people can through the Internet to facilitate the use of local government services, and the mobile phone also can carry out local e-government services, however television is mainly the role of propaganda.

2. REGRESSION ANALYSIS METHOD

2.1 The Outline Of Regression Analysis Method

Regression analysis is a statistical method and skills solving the relationship between variable x and variable y. The outcome of relationship between variables is certain, but the outcome of Y is not so in study, so probability distribution can be used to express. Here, we define conditional mathematical expectation of X and Y to be stochastic variable Y being as average regression function of X.

$$f(x) = E(y/x) \quad (1)$$

Formula 1 displays statistical law of variable x and variable y according to the average sense .We define x as to be independent variable and define y as to be dependent variable in practice use. If we use x to predict y, so the prediction outcome is required, which means sample observations(x_1, y_1),(x_2, y_2), … ,(x_n, y_n),when the outcome of x is appointed ,bring the outcome into formula, the outcome of y can be obtained. The outcome is the prediction outcome of y.

2.2 The General Form Of The Multivariate Linear Regression Model

The general form of the multivariate linear regression model is as follows[4]:

$$\eta(u) = \beta_1\varphi_1(u) + \beta_2\varphi_2(u) + \cdots + \beta_m\varphi_m(u) \quad (2)$$

$$y = \beta_1\varphi_1(u) + \beta_2\varphi_2(u) + \cdots + \beta_m\varphi_m(u) + \varepsilon \quad (3)$$

ε is random error, as well as $\varepsilon \sim N(0, \sigma^2), \varphi_i(u), i = 1, 2, \cdots, m$,all of them are explaining variable in practical problem, they are known function.

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Assume that n experiences have been done, the prediction data is got as the following formula:

$$\begin{bmatrix} u_1 & y_1 \\ \vdots & \vdots \\ u_{n-1} & y_{n-1} \\ u_n & y_n \end{bmatrix} \quad (4)$$

Substitute them into (9.3),so we can get:

$$y_i = \beta_1\varphi_1(u_i) + \beta_2\varphi_2(u_i) + \cdots + \beta_m\varphi_m(u_i) + \varepsilon_i, i = 1,2,\cdots,n \quad (5)$$

ε_i are the random errors happened in the i times experiment and they are independent with each other $\varepsilon_i \sim N(0,\sigma^2)$.

The model concerning regression coefficient $\beta_1,\beta_2,\cdots,\beta_m$ is linear. u is often the vector quantity. For convenience, bring it into matrix notation.

$$Y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}, \quad X = \begin{bmatrix} \varphi_1(u_1) & \varphi_2(u_1) & \cdots & \varphi_m(u_1) \\ \varphi_1(u_2) & \varphi_2(u_2) & \cdots & \varphi_m(u_2) \\ \vdots & \vdots & & \vdots \\ \varphi_1(u_n) & \varphi_2(u_n) & \cdots & \varphi_m(u_n) \end{bmatrix},$$

$$\beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_n \end{bmatrix}, \quad \varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{bmatrix} \quad (6)$$

X is called as model design matrix, it's constant matrix, y and ε are random vector, also in this formula[5] : $Y \sim N_n(X\cdot\beta,\sigma^2 I), \varepsilon \sim N_n(0,\sigma^2 I), I$ is unit matrix, ε is unobservable vector quantity of random error, β is vector made up of regression coefficient, it is unknown and undetermined constant vector.

The next content tells the problem of how to estimate regression coefficient β and test conspicuousness and the fitting degree about model.

2.3 The Least Estimation Of Regression Coefficient

Choose one estimated data of β ,regard it as $\hat{\beta}$ .Make square sum of random error ε get minimum, namely,

$$\min_{\beta} \varepsilon^T\cdot\varepsilon = \min_{\beta}(Y - X\cdot\beta)^T(Y - X\cdot\beta) = (Y - X\cdot\hat{\beta})^T(Y - X\cdot\hat{\beta}) \quad Q(\hat{\beta}) \quad (7)$$

Write it as component form.

Notice that $Q(\beta_1,\beta_2,\cdots,\beta_m)$ is nonnegative secondary type. It is differentiable. According to necessary condition multivariate that multivariate function should take extreme, $\frac{\partial Q}{\partial\beta_j} = 0, j = 1,2,\cdots,m$ is got as the formula:

$$\sum_{i=1}^{n}[y_i - \hat{\beta}_1\varphi_1(u_i) - \hat{\beta}_2\varphi_2(u_i) - \cdots - \hat{\beta}_m\varphi_m(u_i)]\varphi_j(u_i) = 0, j = 1,\cdots,m \quad (8)$$

Arrange it as

$$\begin{cases} [\sum_{i=1}^{n}\varphi_1^2(u_i)]^2\hat{\beta}_1 + [\sum_{i=1}^{n}\varphi_1(u_i)\varphi_2(u_i)]\hat{\beta}_2 + \cdots + [\sum_{i=1}^{n}\varphi_1(u_i)\varphi_m(u_i)]\hat{\beta}_m = \sum_{i=1}^{n}\varphi_1(u_i)y_i, \\ \quad\cdots\cdots \quad\cdots\cdots \\ [\sum_{i=1}^{n}\varphi_1(u_i)\varphi_m(u_i)]\hat{\beta}_1 + [\sum_{i=1}^{n}\varphi_2(u_i)\varphi_m(u_i)]\hat{\beta}_2 + \cdots + [\sum_{i=1}^{n}\varphi_m^2(u_i)]\hat{\beta}_m = \sum_{i=1}^{n}\varphi_m(u_i)y_i, \end{cases} \quad (9)$$

Or , $X^T\cdot X\cdot\hat{\beta} = X^T\cdot Y$ (10)

It's called normal equations. Record $A = X^T\cdot X$ as to be coefficient matrix and $B = X^T\cdot Y$ to be constant matrix. If A^{-1} exist, it's called as correlation matrix. It can be proved that normal equations systems are always having result even if x and y are given randomly. Although the result is not unique when x is not full rank, $\hat{\beta}$ makes residual sum of squares least for any group result.

Especially ,when x is full rank, $r(X) = r(X^T\cdot X) = m$, the solution of normal equations system is $\hat{\beta} = (X^T\cdot X)^{-1}\cdot X^T\cdot Y$,which is estimation of regression coefficient.

In a similar way,the variance is $D(\hat{\beta}) = \sigma^2(X^T\cdot X)^{-1}$,that is to say, $\hat{\beta}$ is a unbiased estimation of β.

The estimation about model can be got when bring $\hat{\beta}$ into model $\eta(u)$: $\hat{Y} = X^T\hat{\beta}$,which is the unbiased estimation of model $\eta(u)$.

Namely

$$E(\hat{Y}) = E(X^T\hat{\beta}) = X^T E(\hat{\beta}) = X^T\beta = \eta \quad (11)$$

and among them,

$$X = (\varphi_1(u),\varphi_2(u),\cdots,\varphi_m(u))^T \quad (12)$$

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3. THE VARIABLE ANALYSIS OF E-GOVERNMENT PUBLIC SERVICE PUBLIC ACCEPTANCE

Through the form of the click rate of questionnaire survey and statistics website, to carry out data statistical analysis of the e-government service acceptance, and through the investigation analysis, to obtain data as shown in Table 2.

Table 1: E-Government Acceptance Survey

Statistical method	Service acceptance	Service satisfaction
Web site hits	48%	89%
Public survey questionnaire	42%	78%

In table 1, it can be seen that the statistical data between Web site rate and questionnaire are not the same, those largely reasons are the presence of survey errors, on one hand the network click repetition rate and delay will lead to network click rate numerical partial large, on the other hand the subjective consciousness of people questionnaire is stronger, and will deviate from the true value, so it should carry out optimization on data [6-8].

(1) Questionnaire survey and Website click rate statistical error analysis

Error analysis carries out optimization method for data exception section, assuming the statistical population data is Ai in the statistical analysis, Ai average value is ai; when the use of ai estimates the overall value of Ai, the error caused can be written as SST, the use of linear relation estimates the overall value of the error, the SST can be decomposed for:

$$\begin{aligned} SST &= \sum (A_i - ai)^2 \\ &= \sum [(b_i - ai) + (A_i - b_i)]^2 \\ &= \sum (b_i - ai)^2 + \sum (A_i - b_i)^2 + 2\sum (b_i - ai)(A_i - b_i) \\ &= \sum (b_i - ai)^2 + \sum (A_i - b_i)^2 + 0 \\ &= \sum (b_i - ai)^2 + \sum (A_i - b_i)^2 \end{aligned} \quad (13)$$

If it can be recorded as:

$$SSR = \sum (a_i - b_i)^2 \quad SSE = \sum (A_i - b_i)^2 \quad (14)$$

Among, SSR is known as the interpretation errors, and SSE is called inexplicable error. It can use the correlation coefficient k, to define interpreted error SSR and the ratio of total error SST.

$$Or \quad SST = SSR + SSE \quad (15)$$

$$K^2 = SSR / SST = 1 - SSE / SST \quad (16)$$

When k = 1, its results are best, our statistical data carries out optimization based on the idea, the data comparison diagram as shown in Figure 3 before and after optimization [9]:

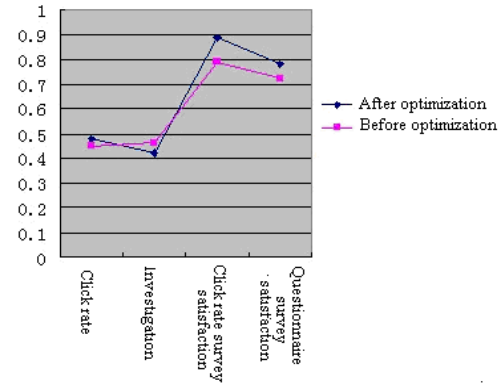

Figure 3: Comparison Chart Before And After Errors Optimization

In Figure 3, it can be seen that model network hit becomes small after optimization, the proportion of population survey is increased, which conforms to the network click errors or repeated click caused by subjective consciousness.

(2) Questionnaire survey and Website click rate statistical residual data optimization

If the sample regression model is good for the data fitting, the estimation v of u should reflect the distribution characteristics, namely v should approximately obey the N $(0, \sigma)$. By the (x, v) compose of point, it is most fell on (-2, +2) levels between ribbon, rather than a disorder randomly distribution is on each strip, and then the results are relatively good.

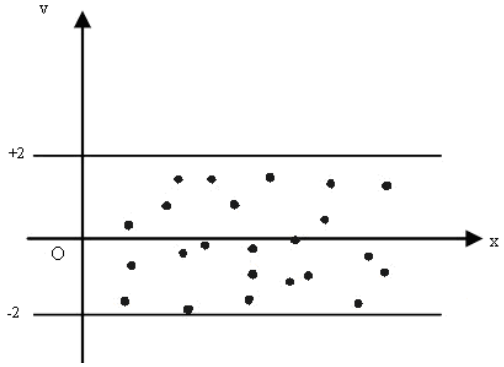

Figure 4: The Better Results Of Statistical Data

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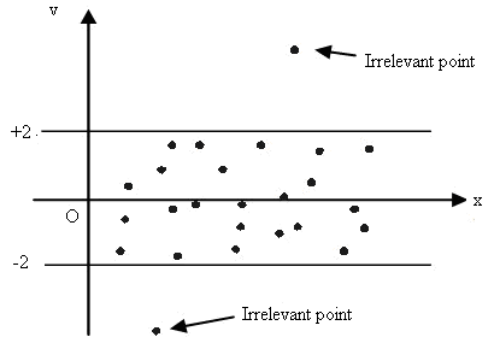

Figure 5: The Poor Results Of Statistical Data

Residual optimization goal is the removal of poor point in the e-government public service, while retaining the standard point closes up the final data in Figure 4. After the residual optimization, data the comparison diagram as shown in Figure 6 before optimization [10].

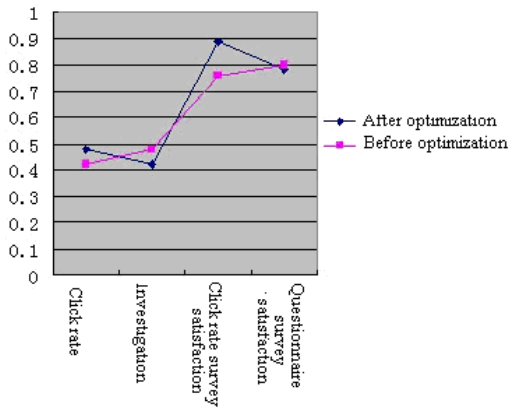

Figure 6: Comparison Chart Before And After Residual Optimization

In Figure 6, it can be seen that model network click rate becomes small after optimization, the proportion of population survey is increased, which conforms to the network click rate or repeated click caused by errors as well as errors caused by population subjective consciousness.

4. E-GOVERNMENT PUBLIC SERVICE PROMOTING STRATEGIES

Through the above data statistical analysis, we can see people for the use rate of e-government public service is not very high, so the government should strengthen the construction of electronic government service and propaganda, this paper puts forward several views strategy.

(1) Mayor mailbox

E-government services can increase the mayor mailbox function, the main function of mayor information is the public towards government consultation and the reaction of some things, government officials give answers, and then to help people, this can make the people through the e-government public services to solve their problems, and also can make the government and the public to carry out government affairs mutual communication.

(2) Websites and mobile phone communications

Government public administration should timely release on the website, the public can know government affairs through the news, video and other ways, and also through the form of text messages, government affair is sent to mobile phone, improving the use rate of e-government.

(3) Government one-stop service

With the help of Internet function, the government can provide related services for the public, such as advisory services, but also can open service hall on the Internet, to carry out one-stop service, solving accreditation or card is lower efficiency problem in the service hall queue, allowing the public to experience the e-government service.

5. CONCLUSION

This paper analyzes the local e-government public service as well as information carrier, through the investigation, the list of mobile phone, television and Internet e-government services are accounted for the use of proportion. And then through the Internet click rate statistics and the form of public questionnaire, to carry out statistic analysis of the local e-government public service acceptance, the use of the error analysis and residual analysis method carry out optimization the processing on data, in the data to drop network click repetition, error and other error parts that can provide a survey of relatively reliable data. Finally, through the survey data, it can put forward opinion and strategy on the local electronic government affairs. Electronic government public service has the use of a wide range of services, efficient and many other advantages, its use can improve the efficiency of the government, on the other hand it makes people experience the convenience of e-government services, therefore it should strengthen this construction, to make local e-government public service system that is more advanced and perfect.

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