



Method for Extracting Information of Database of Smart Phone Terminal in Lock Screen Mode

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Abstract. In order to improve the database management and scheduling ability of smartphone terminal, it is necessary to optimize the information extraction of smartphone terminal database in lock screen mode. through the dynamic mining of smartphone terminal database data, the optimal processing of smart phone terminal database data information is realized, and this paper proposes an algorithm to extract the resource information of the smartphone terminal database under the lock screen mode based on the Internet. Using distributed wireless sensor to form the Internet model of smart phone database collection, and the optimal deployment design of data acquisition Internet of things node is carried out. The spectrum analysis method is used to detect the abnormal resource information of smart phone terminal database in lock screen mode, and the detection results are fuzzy clustering to realize the extraction of smart phone terminal database resource information in locked screen mode under the environment of Internet of things. The simulation results show that the algorithm has high accuracy, good recall, strong anti-interference ability and good adaptive ability to collect the resource information of smart phone terminal database in lock screen mode.

Keywords: Lock screen mode · Smartphone · Terminal database · Resource information · Extraction

1 Introduction

The smart phone terminal database resource information collection system in the lock screen mode continuously provides the security information service for the smart phone transmission, including automatic crash alarm, road aid, remote unlock service, hands-free telephone, and road navigation, etc. [1, 2].

In the design of smart phone terminal database resource information collection algorithm and system design in the locked screen mode, The key is to establish the communication network system of relevant workshop. Based on the Internet of Things, the smart phone terminal database information networking between vehicles and roads is constructed [3]. At present, in the locked screen mode, the resource information acquisition method of smartphone terminal database is mainly used for domain feature

analysis method, etc. In addition, the feature sampling of smartphone terminal database resource information in the locked screen mode is carried out. In reference [4], a resource information extraction method for smart phone terminal database in QoS constrained lock screen mode is proposed, which merges the sampled data sparsely, and carries on the classification and repair after dynamic data acquisition combined with autocorrelation feature matching method, in order to make data collection more accurate but this method is easy to be interfered by dynamic disturbance features, which leads to the poor accuracy of acquisition, which reduces the extraction effect. In reference [5], a dynamic data acquisition algorithm for smart phone terminal database Internet of things network in the physical layer network coding method is proposed in the cloud computing environment is used for quantitative coding of data, the data of encoded data are processed blindly by CPM, and the ability of collecting and balancing the resource information of smartphone terminal database in locked screen mode is improved. However, the computational overhead of the algorithm is too large and the real-time performance of data acquisition is not good [6].

In order to solve the above problems, this paper proposes a resource information extraction algorithm for smart phone terminal database based on Internet of things lock screen mode. The adaptive weighting algorithm is used to fuse the resource information of smart phone terminal database in lock screen mode, and the spectral characteristic quantity of smart phone terminal database resource information in lock screen mode is extracted. The spectrum analysis method is used to detect the abnormal resource information of smart phone terminal database in lock screen mode, and the detection results to realize the extraction of smart phone terminal database resource information in locked screen mode in a network environment. Finally, the method of simulation experiment is used to verify its application performance in improving intelligence and accuracy of smart phone terminal database information in lock screen mode [7].

2 Internet of Things Node Distribution and Data Pre-processing of the Database Resource Information of the Smart Phone Terminal

2.1 Optimal Deployment of Internet of Things Node for Resource Information Collection of Smart Phone Terminal Database in Lock Screen Mode

In order to collect the resource information of smart phone terminal database accurately in lock screen mode, the method is used to design the node distribution of Internet of things, in the lock screen mode, the statistical feature analysis method is used to extract the resource information of the smartphone terminal database and the node distribution model of Internet of things of smart phone terminal database information distribution in lock screen mode is constructed [8]. The omni-directional node tree model of FP-tree microcell is used to construct the distributed node model of smart phone terminal

database resource information distribution Internet of things in lock screen mode, as shown in Fig. 1.

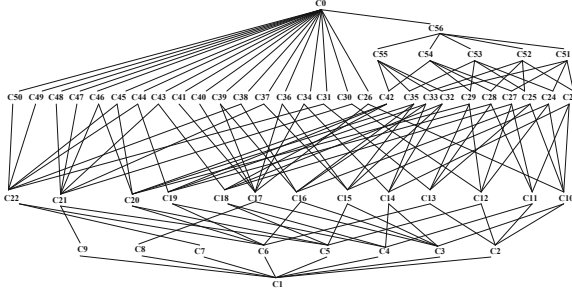


Fig. 1. Node communication graph model of database resource information distribution network of smart phone terminal

In the node communication graph of the database resource information distribution of the smart phone terminal database in the lock screen mode shown in Fig. 1, the sink node of the network of the intelligent mobile phone terminal database resource information collection object networking network in the lock screen mode is represented by four-tuple $\{S_1, S_2, \dots, S_L\}$, obtaining the interrupt node of the database resource information distribution network of the smart phone terminal database in the lock screen mode as $node_j$, and performing the sparse characteristic reconstruction by the transmission information fusion method in the neighbor information table, constructing a state transition matrix of a network transmission channel of a database resource information distribution object of a smart phone terminal in a lock screen mode, which comprises the following steps of:

$$\mathbf{x}(k + 1) = \mathbf{A}(k)\mathbf{x}(k) + \mathbf{\Gamma}(k)\mathbf{w}(k) \tag{1}$$

$$\mathbf{z}_i(k) = \mathbf{H}_i(k)\mathbf{x}(k) + \mathbf{u}_i(k), \quad i = 1, 2, \dots, N \tag{2}$$

The method comprises the following steps of: carrying out self-correlation characteristic sampling on transmission data in a database resource information distribution network channel of a smart phone terminal database in a lock screen mode, the loop iteration and loop iteration process in the database resource information acquisition process of the smart phone terminal in the lock screen mode are carried out by adopting a fuzzy directional clustering method, as shown in Fig. 2.

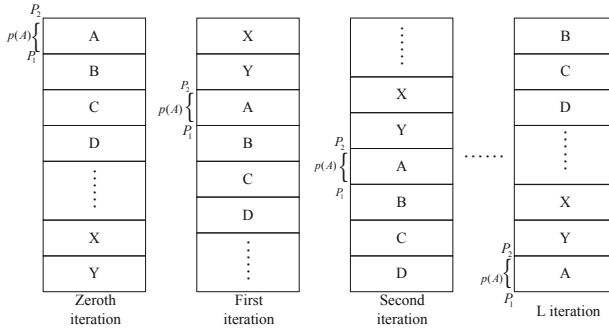


Fig. 2. Cyclic iterative process of resource information collection in smartphone terminal database in lock screen mode

According to the iterative process of data acquisition given in Fig. 2, set $x(t)$, $t = 0, 1, \dots, n - 1$, is made as a training sequence, and the initialization pointer count G in the process of collecting resource information of smartphone terminal database in lock screen mode is counted. The number of data scale samples of smartphone terminal database in the input Internet of things is N , in which the training vector mode is based on the analysis. Using distributed wireless sensor to build data collection model of smartphone, and the optimal deployment design of data acquisition node is carried out [9–11].

2.2 Information Fusion Processing of Smartphone Terminal Database Resources in Lock Screen Mode

On the basis of designing and optimizing the deployment of Internet of things nodes collected by smart phone terminal database information in lock screen mode, the fusion processing of smart phone terminal database resource information in lock screen mode is carried out, and the distance between the distributed search result of smartphone terminal database data Internet of things $x(t)$ and the connection weight vector ω_j of smart phone terminal database resource information clustering center in all lock screen mode is calculated. Represented as Euclidean distance

$$d_j = \sum_{i=0}^{k-1} (x_i(t) - \omega_{ij}(t))^2, j = 0, 1, \dots, N - 1 \tag{3}$$

In the node connection diagram of smart phone terminal database resource information distribution Internet of things in lock screen mode, the sampling amplitude of the node transmission data of smart phone terminal database resource information distribution Internet of things in lock screen mode is obtained:

$$\alpha_{desira}^i = \alpha_1 \cdot \frac{Density_i}{\sum_i Density_i} + \alpha_2 \frac{AP_i}{AP_{init}} \tag{4}$$

Wherein the weighting coefficient of the data self-adaptive fusion of the smart phone terminal database data is met:

$$\begin{cases} \alpha_1 + \alpha_2 = 1, \alpha_1, \alpha_2 \in [0, 1] \\ \alpha_2 = \frac{\max_i(AP_i) - \min_i(AP_i)}{AP_{init}} \end{cases} \quad (5)$$

Under different transmission medium attenuation modes, the information fusion support vector set of smart phone terminal database resource information under lock screen mode is as follows: under the mode of Internet of things breakpoint locking screen, the information fusion support vector set of smart phone terminal database resource information is as follows:

$$\begin{aligned} x_{id}(t+1) = & \overline{wx_{id}(t)} + c_1 r_1 [r_3^{t_0 > T_0} p_{id} - x_{id}(t)] \\ & + c_2 r_2 [r_4^{t_0 > T_s} p_{gd} - x_{id}(t)] \end{aligned} \quad (6)$$

Thereby realizing the data sampling of the nodes connected with the database resource information distribution network of the smart phone terminal in the lock screen mode, under the routing mechanism, and obtaining the confidence probability of the data acquisition accuracy distribution as follows:

$$K_{wpg}(x, y, w_i) = \begin{cases} 1 & d(\omega_i, k) \leq r - r_u \\ u\left(\frac{-\alpha_1 \theta \beta_1}{\theta_2 \beta_2}\right) + \alpha_2 & r - r_u < d(\omega_i, k) < r + r_u \\ 0 & \text{else} \end{cases} \quad (7)$$

In the above formula, r_u ($0 < r_u < r$) represents the adaptive weighting operator of static routing sub-node, and $\alpha_1, \alpha_2, \beta_1, \beta_2$ respectively corresponds to unclear logic control detection coefficient of Internet of Things routing in smart phone terminal database [12]. After n jump, the probability of accurate transmission between the middle layer and the layer of the link layer of the Internet of Things collected by the database resource information of the smartphone terminal in the lock screen mode is:

$$P_{graph} = \left\{ 1 - \left[1 - (1 - P_e)^2 (1 - P_d) \right]^m \right\}^n \quad (8)$$

The detection method is used to design the routing of smart phone terminal database resource information in lock screen mode. The optimal distribution probability of smart phone terminal database resource information fusion in n -hop lock screen mode is obtained by P_{AOMDV} :

$$P_{AOMDV} = (1 - P_d)^2 \left\{ 1 - \left[1 - (1 - P_e)^n (1 - P_d)^{n-1} \right]^m \right\} \quad (9)$$

In that lock screen mode, the information flow of the database resource information of the smart phone terminal in the lock screen mode is partitioned by a sparse fusion method,

so that the data information fusion process of the database of the smart phone terminal is realized, and the anti-interference capability of the output acquisition is improved.

3 Optimal Implementation of Resource Information Extraction Algorithm

3.1 Extraction of Spectral Feature Quantity from Database Information of Smart Phone Terminal in Lock Screen Mode

The feature decomposition method is used to reconstruct the neighbor cluster head of the Sink node of the linearly, and the output feature quantity is expressed as $\mathbf{R}_i(k) = E[\tilde{\mathbf{v}}_i(k)\tilde{\mathbf{v}}_i^T(k)]$. In combination with the following repair methods suitable for routing, the forwarding protocol of the digital fusion link layer for the resource information collection of the smart phone terminal database in the lock screen mode is obtained as follows:

$$\begin{aligned} CT_{ID_j} &= \{C'_1, C'_2, C'_3, C'_4, C'_5\} \\ &= \{(C_1rk_{1ij})^{rk_{3ij}}, (C_2rk_{2ij})^{rk_{3ij}}, C_3k', C_4k', C_5rk_{6ij}\} \end{aligned} \quad (10)$$

In the above formula, C_1, C_2, C_3 represent the distributed frequency band of resource information extraction, according to the correlation degree of the data fusion center, carries on the autocorrelation matching, obtains the data sampling frequency band interval:

$$\begin{aligned} c &= z \cdot \left[\frac{x_0}{2} \right] = (q_p(z)p + r_p(z)) \cdot \left[\frac{x_0}{2} \right] \\ &= q_p(z)p \cdot \left[\frac{x_0}{2} \right] + r_p(z) \cdot \left[\frac{x_0}{2} \right] \end{aligned} \quad (11)$$

According to the sampling time interval and beam distribution interval of smart phone terminal database resource information in lock screen mode, the adaptive fusion and optimal channel allocation of resource information extraction are carried out. On this basis, the spectral features of smart phone terminal database resource information in locked screen mode are extracted, and the results of frequency feature extraction of transmission data are explained, database information distribution in locked screen mode are described as follows:

$$S_b = \sum_{i=1}^e p(\omega_i)(u_i - u)(u_i - u)^T \quad (12)$$

$$S_\omega = \sum_{i=1}^e p(\omega_i)E \left[\frac{(u_i - u)(u_i - u)^T}{\omega_i} \right] \quad (13)$$

$$S_i = S_b + S_\omega \quad (14)$$

And carrying out normalization processing on the information flow reorganization model $X(t)$ of the database resource information of the smart phone terminal in the lock screen mode, and improving the accuracy of the feature extraction.

3.2 Collection and Output of Resource Information of Smart Phone Terminal Database in Lock Screen Mode

By adopting the spectrum analysis method, the abnormal detection of the database resource information of the smart phone terminal database in the lock screen mode is carried out, and the sparse random sampling mode function of the database resource information of the smart phone terminal in the lock screen mode is met:

$$X'(t) = X(t)/\|X(t)\| \quad (15)$$

The anti-interference processing is carried out by the data filtering method, and $\tau + 1$ samples are randomly sampled in the node of the resource information extraction to obtain the data transmission key of the database of the smart phone terminal.

$$pk = \langle x_0, x_1, \dots, x_\tau \rangle \quad (16)$$

The distribution model of smartphone data transmission that terminal database information distribution Internet of things in lock screen mode is constructed, and the output number acquisition sequence x_0, x_1, \dots, x_τ , is obviously:

$$parity(r_p(z)) = Decrypt(sk, c) \quad (17)$$

$$parity(q_p(z)) = parity(r_p(z)) \oplus parity(z) \quad (18)$$

The fuzzy clustering is carried out on the detection result, the data clustering is carried out by adopting the fuzzy clustering method, and the acquisition result of the database resource information of the smart phone terminal database under the output lock screen mode is as follows:

$$\begin{aligned} \frac{C_3 e(sk_{i2}, C_2^{x_i^{-1}})}{e(C_1^{x_i^{-1}}, sk_{i1})} &= me(g_1, g_2)^r e(g_1, g^{u_i(H_1(ID_i, upk_i) - H_1(g, g_1, g_2, g_3, h))})^r \\ &\cdot \frac{e[g^{u_i}, (g_1^{H_1(g, g_1, g_2, g_3, h)} h)^r]}{e[g_2^a (g_1^{H_1(ID_i, upk_i)} h)^{u_i}, g^r]} \\ &= me(g_1, g_2)^r e(g_1, g^{u_i(H_1(ID_i, upk_i) - H_1(g, g_1, g_2, g_3, h))})^r \\ &\cdot \frac{e[g^r, (g_1^{H_1(g, g_1, g_2, g_3, h)} h)^{u_i}]}{e(g_2^a, g^r) e[(g_1^{H_1(ID_i, upk_i)} h)^{u_i}, g^r]} \\ &= m \end{aligned} \quad (19)$$

The autoregression linear equilibrium method is used to decompose the resource information of smart phone terminal database in locked screen mode linearly in the link layer.

$$\frac{n}{8} = r_1 = 2r_2 = 2^2r_3 = \dots = 2^{i-1}r_i = \dots \quad (20)$$

The construction test statistics are as follows:

$$Q = \frac{V_n - 2n\pi(1 - \pi)}{2\sqrt{n\pi(1 - \pi)}} \quad (21)$$

According to the test statistics, the sampling decision is carried out to improve the accuracy of extracting resource information from smartphone terminal database in lock screen mode [13], the specific process is as follows (Fig. 3):

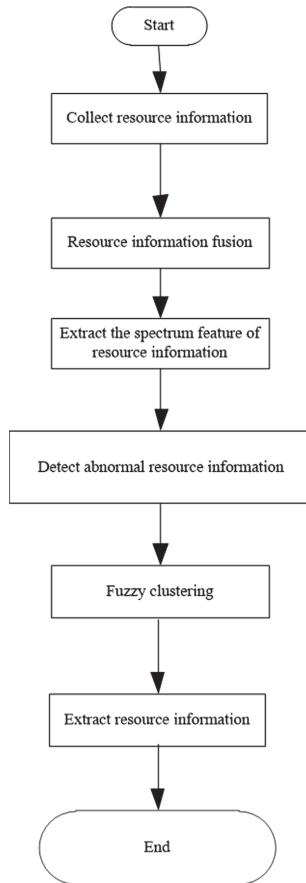


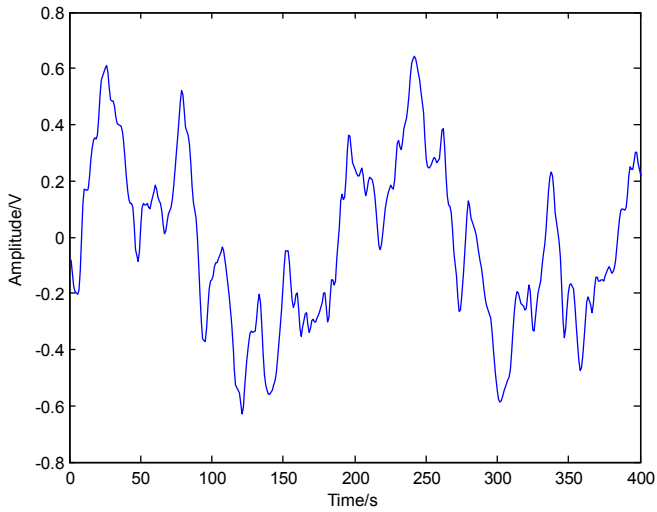
Fig. 3. Resource information extraction process of smartphone terminal database

4 Simulation Experiment and Performance Analysis

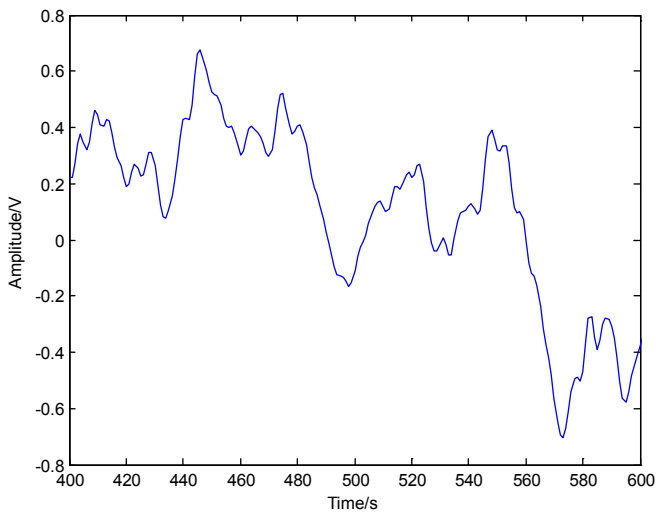
In order to verify the application performance of this method in the realization of smart phone terminal database resource information collection in lock screen mode, the simulation experiment is carried out. This experiment is carried out in Matlab environment. The experimental results are as follows: IntelCore4-530 1G memory, operating system Windows 7, distributed Internet of things transmission link capacity of smart phone terminal database resource information collection in lock screen mode is 120 Mbps. The time delay of resource information extraction is 18 ms, the initial data length is 1024. The frequency is $f_1 = 1.25$ Hz, of smartphone terminal database resource information in lock screen mode is terminated by using frequency GHz, lock screen mode. The energy attenuation coefficient of resource information distribution Internet of things node is $\lambda = 0.56$, the distribution grid unit from resource information is 200×200 , and the packet size is 1200 Bps. The inertia weight of data filtering is 1.25. The channel attenuation intensity of smartphone terminal database resource information transmission link layer in lock screen mode is 295 pJ/(bit ·m4). The transmission frequency is 10 kHz, 16 kHz, 26 kHz and 32 kHz. According to the above simulation environment and parameter setting, the simulation experiment of smart phone terminal database resource information collection in lock screen mode is carried out. The output time domain waveform diagram of smart phone terminal database information collected by each frequency point in lock screen mode is shown in Fig. 4.

The results of Fig. 4 show that the data of smartphone terminal database with different frequency points can be accurately extracted by using this method to collect the resource information of smartphone terminal database in lock screen mode. The change of signal amplitude has significant positive correlation with the increase of distance, which indicates that the dynamic acquisition and tracking performance of smartphone terminal database number is better. In order to compare the performance, the signal-to-noise ratio (SNR) of 10000 Monte Carlo experiments is set to $-20-20$ dB, and the curve of accurate data acquisition is shown in Fig. 5.

Analysis of Fig. 5 shows that the accuracy rate of the method in this paper reaches the highest when the number of iterations is 80, the accuracy rate of the method in literature [5] is the highest when the number of iterations is 100, and the accuracy rate of the method in literature [4] is only 96%. It shows that the method of this paper has high accuracy of resource information extraction, good data recall performance, strong anti-interference ability of smart phone terminal, strong database information extraction process, and good adaptive ability.



(a) 10kHz/16kHz frequency



(b) 26KHz/32KHz frequency

Fig. 4. Output time domain waveform of smartphone terminal database information acquisition in lock screen mode

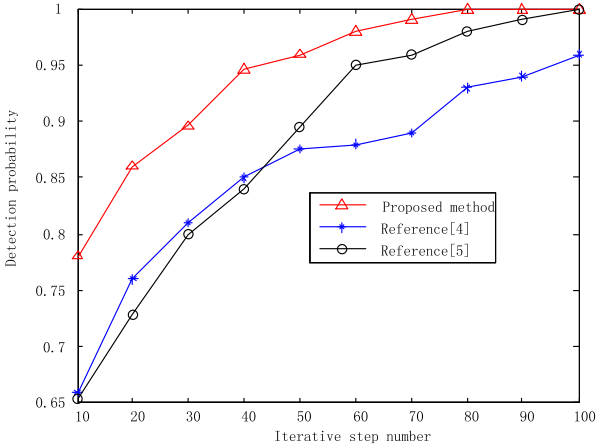


Fig. 5. Comparison of the accuracy of the information extraction of the database of the smart phone terminal

In order to verify this method, the data collection accuracy of the smartphone terminal database of the method in this paper, the method in literature [4] and the method in literature [5] are compared and analyzed, and the comparison results are shown in Fig. 6.

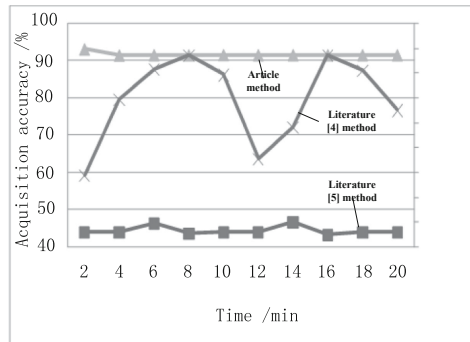


Fig. 6. Comparison results of information collection accuracy of smartphone terminal database

According to Fig. 6, the collection precision of the smartphone terminal database information of the method in this paper presents a stable state with the growth of time, and the collection precision can reach 92%, while the collection precision of the smartphone terminal database information of the methods in literature [4] and literature [5] is only 77% and 46% when the time is 20 min. The method in this paper is more accurate than the literature method, which shows that this method can extract the information of smartphone terminal database accurately.

5 Conclusions

Due to the low precision of extracting resource information from smartphone database in the traditional lock screen mode, an algorithm of extracting resource information from smartphone terminal database based on the Internet of things is proposed. Carrying out fusion processing of the database resource information of the smart phone terminal database under the lock screen mode by adopting an adaptive weighting algorithm, and extracting the spectral characteristic quantity of the database resource information of the smart phone terminal database in the lock screen mode, By adopting the spectrum analysis method, the abnormal detection of the database resource information of the smart phone terminal in the lock screen mode is carried out, and the detection result is subjected to fuzzy clustering, and the information extraction of the database resources of the smart phone terminal in the lock screen mode under the Internet of Things environment is realized. The experimental results show that under the lock screen mode of this method, the accuracy of resource information extraction of smartphone terminal database is better, the anti-interference is strong, and the intelligent mobile phone terminal database information dynamic management has good application value in the dynamic management of the database information of the smart phone terminal. Because the problem of extraction time is not considered when extracting the resource information of smart phone terminal database in lock screen mode, in the future research, we will compare the extraction time of the resource information of smart phone terminal database to further verify the reliability of this method.

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