

## Intelligent Model of Home Furnishing and Transportation Based on Improved RFID Web Fuzzy Clustering

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**Abstract:** This paper uses the fuzzy clustering method based on clustering path division, according to user access path. In the cluster, according to the access time and Agent classification of user, this method is then according to the user to all pages in order to visit division. The hardware of intelligent home furnishing controller by the advanced ARM9 embedded system, mobile phone module and RFID module. Intelligent transportation system through the sharing of traffic information, can realize the coordinated traffic signal control, effective traffic prediction and grooming. The paper presents intelligent model of home furnishing and transportation based on improved RFID web fuzzy clustering. Experiments show that RFID and fuzzy clustering can improve reliability of intelligent traffic and home furnishing and effectiveness. *Copyright © 2013 IFSA.*

**Keywords:** Intelligent home furnishing, Intelligent transportation, Fuzzy clustering, RFID.

### 1. Introduction

Mining field in the Web log, clustering analysis is an important research topic, with fuzzy processing ability of fuzzy clustering is introduced into fuzzy theory is the analysis of the existing data. The FCM algorithm is currently widely used fuzzy clustering algorithm. But it also exists some shortcomings, such as the FCM algorithm by the initial impact is relatively large; the iteration is easy to fall into local minimum. This article from the modified clustering objective function and the initial implosion of the class put forward a kind of improved FCM algorithm.

The RFID solution is RFID technology vendors for RFID application plan development characteristic industry, can be customized according to the actual

requirements of different enterprises. RFID solutions can be classified according to the industry, logistics, anti-theft security, identity recognition, asset management, animal management, fast payment, please click here to view the scheme.

Indoor Wi-Fi terminal positioning before the first planned in accordance with the actual situation of the indoor terminal maps stored in the database of information processing; AP access point is then set according to the indoor distribution, we need to set a fixed location reference tags as a measurement reference point to help position calibration, set the number of access points according to the specific indoor.

Electronic label vehicles is introduced, the fusion of multiple RF field and digital technology in the leading technology, using software radio technology,

unique micro power technology, anti-collision technology, response protocol, local activation of space access technology patent portfolio, can fully meet the demand of automatic recognition of the high speed development.

Intelligent home furnishing system can realize the communication of information through the GSM/GPRS/CDMA/ network, ZigBee network, Internet domain and community information network [1]. Users in the outdoor appliances and lighting device through the mobile phone control of home, also available anti-theft, fire, gas leakage alarm information home in a timely manner; at home through the regulation of home appliance remote controller. The indoor host controller also has a visual intercom system function, can refer to all kinds of information community released, can be issued a warning to the community security distress signal when necessary. The system is mainly composed of a smart home furnishing a controller and a plurality of indoor monitoring ZigBee modules.

To analyze a collection of data objects, usually to divide the class is unknown. In this case, the clustering is more appropriate, by clustering, we can identify the dense and sparse regions can discover user characteristics different access paths from the users of the site, to find the overall distribution patterns and data attributes between the interesting relationships. This paper uses a method of clustering W path planning based on EB log, by dividing the user access path, fuzzy C means clustering algorithm for peer-to-peer long path clustering, to obtain the optimal clustering number, greatly improving the W EB access patterns discovery efficiency.

Electronic label also known as radio frequency label, transponder, data carrier; the reader is also known as the readout device, scanner, communicator, reader (depends on whether the electronic tags can be wireless overwrite data). By coupling the RF signal components of the space between tag and reader (no contact) coupling, in the coupling channel, according to temporal relations, the exchange of, data to realize the energy. There are two types of coupling RF signal between the reader and the tag.

Work or life needs different pattern to match, no one by one to switch lights and light, just set according to your heart, you can achieve "one-click" scene mode and the scene can be "one-click" memory storage, which is the major force of China intelligent scene control and storage function let the work and life's advantage. Example: in the study on the Internet are tired, want to rest for a while, then as long as the press of a button, enter the rest mode, by a bright light will gradually darken and is particularly soft, can be a good nap for a while. Of course, such as theater mode, drawing pattern and other patterns can be preset and stored and the realization of "one-click" switch. The paper presents intelligent model of home furnishing and transportation based on improved RFID web fuzzy clustering.

## 2. Intelligent Home Furnishing and Transportation by Web Fuzzy Clustering

Through the fuzzy membership to a data object is added to a weight value and to optimize the number of clusters  $C$  into fuzzy clustering validity function in the algorithm. To demonstrate the usefulness of the improved FCM algorithm, the algorithm is applied to two areas: network intrusion detection and Web log mining. Intrusion detection is a second line of defense of network security [2]. In this paper, analysis of the intrusion detection technology to point puts forward a method of Intrusion Detection Based on improved FCM algorithm. The advantage of this method is not need labeled training data sets. In this paper, it is using the KDD99 data set as the experimental data.

Intelligent controller can be pre-set zone, the security of the entire bedroom in the wireless security alarm system, infrared detectors for active human body to detect signal. Door sensor detectors switch control doors and windows. If the doors and windows are opened illegally broke into someone from the outside world the controller immediately by the siren's live sound and light alarm and press the set alarm phone number to send alerts to the owner and upload a warning to the alarm center.

To reduce the traffic accident system, increase traffic safety. Through the implementation of traffic control, can make the traffic flow conflicts were separated from time and space, so as to reduce traffic accidents, increase traffic safety. Traffic control and reasonable, can effectively guide and scheduling of traffic flow, the city traffic flow is maintained in a stable state, so as to avoid or mitigate traffic congestion, reduce the delay of vehicles in road traffic, improve the overall efficiency of transportation.

The basic method of clustering is often defined between the distance is defined between the two objects in the distance of two objects, but also the basic methods do not depend on the distance of the definition of the cluster distance between two objects: firstly, the definition of a optimization objectives, optimization is a local minimum first defines an optimal target first, define an optimization objective optimization is a local minimum [3]. Clustering and classification of difference: clustering is an unsupervised learning process is the observation of learning; learning process and classification is a supervised clustering and classification of the genus distinction between supervision, learning from examples.

The fundamental difference between them is the fundamental distinction, classification, need to know in advance in accordance with the fundamental difference between classification according to the attribute values and clustering is to find this classification attribute value. General attribute values

are of two kinds: numerical attributes and attribute values and symbolic attributes.

With the social and economic structure, the family structure and the development of information technology and the human of home furnishing environment safety, comfort, efficiency requirements increase, resulting in increased demand for intelligent home furnishing, at the same time, more and more families requirements of intelligent home furnishing products not only to satisfy basic needs, more requirements of intelligent home furnishing system function expansion, even in extension services can do simple, convenient, safe, as is shown by Equation 1.

$$E_{jA}^{\varepsilon}(m,n) = \sum_{m' \in J, n' \in K} w_A^{\varepsilon}(m',n') [D_{jA}^{\varepsilon}(m+m',n+n')]^2 \quad (1)$$

Controller inside with 1 ZigBee module and it is communication through the monitoring device for ZigBee wireless network and home furnishing in, as the coordinator of ZigBee network (FFD) to use. It is responsible for the construction of intelligent home furnishing ZigBee network, sending and receiving control system and the command center and makes the corresponding processing. At the same time, from the routing node (FFD) or a terminal node (RFD) sends the data received to the system control center.

When a team has many intersections in a trunk road, coordinated control makes the vehicle in the main intersection always arrive at the beginning of green, so there is no need to stop the intersection, forming a traffic green wave band [4]. Green wave control can effectively improve the vehicle speed and traffic capacity, ensure that the road is smooth and

reduce the vehicle in the running process of the delay time and energy consumption. The control parameters of arterial traffic coordinated control are the cycle length. Green ratio and phase difference, the control goal is generally the average delay and the number of parking vehicles.

Although the concept of intelligent home furnishing appears very early, the market demand will always exist, but for a long time the development of intelligent home furnishing due to subject to the related technical breakthrough, has not been universal large-scale application. Intelligent home furnishing technology existing in the present market is introduced as follows: all control signals in this way must be connected through the cable, signal wire controller end is more formidable, but encountered problems are difficult. Cable faults are very prominent, wiring complexity, heavy workload, high cost and difficult maintenance, not easy to network. These shortcomings resulted in intelligent home furnishing of wired way just stays in the concept and the pilot phase, not a large-scale promotion.

Many methods of cluster analysis, it usually refers to the record in the database, according to the classification rules some classification rule, reasonable certain classification rules of a collection of records, where each record to determine the category (e.g., K - average algorithm, K - center algorithm, based on the hierarchical agglomerative clustering based on hierarchical clustering division etc.) [5]. In general, for the same data set, if using different clustering methods, may results in the different division, as is shown by Fig. 1.

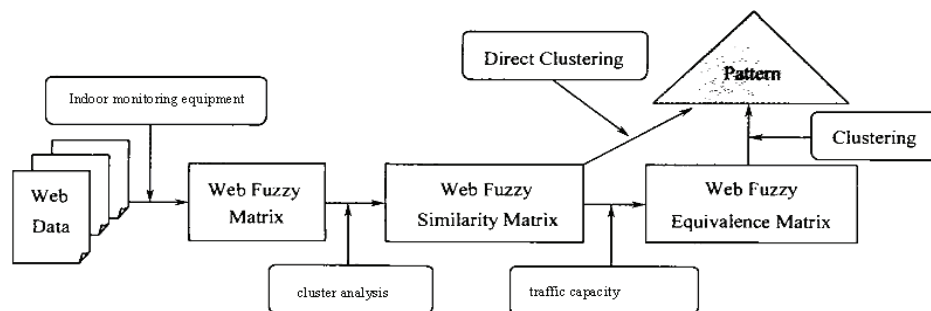


Fig. 1. Intelligent Home Furnishing and Transportation by Web Fuzzy Clustering storage.

Indoor monitoring equipment according to use can be divided into 3 categories: the first category is the switch and the socket, the socket of the most simple through the small electronic switch for household electrical appliances (such as electric rice cooker, water dispenser, TV, refrigerator, air conditioner, washing machine, electric curtains and does not require dimming the lamp) power switch control; intelligent switch and socket complicated with output power adjustable function, used for dimming or electric fan pendant lamp, floor lamp the speed etc.

Second types of sensor products, of which the piezoelectric infrared sensor and magnetometer sensor used for anti-theft, smoke sensor for fire, gas sensor for gas leakage and manual alarm button for emergencies (such as the elderly sudden onset). These nodes are equipped with ZigBee module, as the terminal nodes of the network (RFD). The third class for a handheld remote controller, in addition to the household electrical appliance switch control, dimming control, also has lighting scene setting and control function.

The rise of the Internet of things will bring a broad market space for ZigBee. Because of the Internet of things will be all kinds of information sensing transmission unit and the Internet combine to form a huge network, in the vast network, need for transmitting data between sensing transmission unit and a communication network, while the other wireless technology, ZigBee in the investment, construction, maintenance and other advantages, in the IOT intelligent home furnishing will be widely applied to the fields.

Timing control to the historical traffic flow data as the basis, find out the different traffic flow changes every day / week and for a period of time, by means of artificial method or computer simulation prepared different days / week and different time zone distribution scheme, which belongs to the open loop control, not easily according to the flow condition real-time adjustment control scheme. Because the timing control of traffic signal machine requirements low, no need of real-time traffic, which is still a control strategy for the city road traffic system is widely used in the.

Clustering and classification of different is clustering requires dividing the class is unknown. Clustering is a classification of the data into classes or clusters of such a process, so the objects in the same cluster is very similar and objects in different clusters have great dissimilarity. From a statistical point of view, cluster analysis is a method of simplifying data through data modeling [6].

Statistical cluster analysis method of the traditional system clustering method, decomposition, addition method, dynamic clustering, clustering ordered samples, there are overlapping clustering and fuzzy clustering. Cluster analysis tools using k-mean, k- center point algorithm has been added to many famous statistical analysis software package, such as SPSS, SAS etc. From a machine learning perspective, clusters correspond to hidden patterns. Clustering is an unsupervised learning process search clusters.

Cluster network ZigBee combination of the star and mesh structure, we use the intelligent home furnishing controller and ZigBee sensor nodes in real application cluster network. It has good scalability, for the small-sized apartment or villa users, can also increase the routing nodes to extend the network coverage for large-sized apartment; the user, can reduce the routing nodes into a star network, in order to save energy, to accelerate the speed of data transmission.

$$H(x, y) = \begin{bmatrix} \frac{\partial^2 f}{\partial x^2} & \frac{\partial^2 f}{\partial x \partial y} \\ \frac{\partial^2 f}{\partial y \partial x} & \frac{\partial^2 f}{\partial y^2} \end{bmatrix} \quad (2)$$

Clustering is according to certain requirements and rules for classifying things, set group of physical or abstract objects into the process is composed of

similar objects multiple classes. In this process, there is no teacher guide, didn't have any on the classification of prior knowledge, only rely on the things between the similarity criterions for dividing the class, which belongs to the unsupervised classification category, in many applications, can be a kind of image data as a whole to stay [7]. Clustering and classification are not the same, it divided the class is unknown. In the classification mode, for what classes of this information exists in the target database.

In the man-machine interface, it is using TFT 5 inch LCD screen and the configuration of the touch screen. Can be used to display various information visitor images and small transmitted and it is the user easily input data to control various home furnishing equipment. In addition to more flexible control, using the I2C bus interface design of keyboard interface processor, which can be extended in various control, alarm, as is shown by Fig. 2.

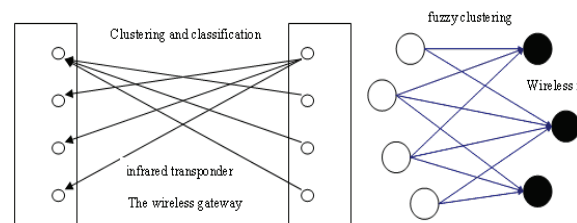


Fig. 2. The wireless gateway by fuzzy clustering architecture.

The wireless gateway: all wireless sensor and wireless linkage equipment information collection control terminal. All sensor, detector will collect the information to the mobile phone, tablet computer, the computer authority management device through the wireless gateway, in addition the control command by the management device through the wireless gateway sends to the linkage equipment [8]. Then if no one at home when the door is opened, the door to detect an intruder, the intrusion alarm through the wireless gateway is sent to the master mobile phone, mobile phone message is received send shock ringbone, master confirmation send the control command, electromagnetic lock automatically locks and trigger the wireless alarm device sends out alarm.

Multi-agent system is a front subject in artificial intelligence, is an important research branch of distributed artificial intelligence, its goal is to build a large complex system into small, communicating and coordinating, easy to manage subsystem, the subsystem of autonomous ability and the coordinated ability to solve complex system control problem. City area traffic network with real-time dynamic characteristics of the road traffic scale and complexity of the traffic flow, the multi-agent system is applied to the city traffic network control research issues concerned. To design the structure of city intelligent traffic control based on it.

The controller is equipped with Ethernet interface, with the controller on the Web server; users can monitor the home environment and various appliances by Internet. Fig. 3 RS-485 interface for communication with the district Wuguan (matched with the original cell network). Using MAX3232 two USART transceivers are ARM9, consisting of two RS-232 ports and one RS-485 ports.

Clustering is not know in advance the target database to the bottom with the number of class situation, hope will have some records into different clusters or "cluster" that is high in the same clustering, similarity and in different clustering between has low similarity. Clustering analysis is the method in mathematical research and treatment given to cluster image, is a kind of multivariate statistical analysis. It is a category of labeled samples set according to some criterion is divided into several subsets, have similar samples as far as possible to make the classified as a class, not similar samples as far as possible into different categories.

Select the middle strategy between the centric and based on the method of object based on the representative. It is not a single centric or objects to represent a cluster, but the choice of a fixed number of representative points in data space [9]. Chameleon is a dynamic model in a hierarchical clustering algorithm. The merge process dynamic model based on Clustering for natural and Isomorphism of discovery and as long as the similarity function can be applied to all types of data, as is shown by Equation 3.

$$\delta_{oj}(k) = -\frac{\partial E}{\partial Net_j(k)}; \frac{\partial E}{\partial w_{ij}} = \frac{\partial E}{\partial Net_j(k)} \cdot \frac{\partial Net_j(k)}{\partial w_{ij}} \quad (3)$$

Clustering analysis is one of the core technologies in the field of data mining; it is from a given data set search value exists between data objects of the data distribution model. Cluster analysis based on the principle that objects within the same cluster have similar as big as possible, but not the same object in the cluster has a different possible in clustering analysis, the main problem is how to without prior knowledge, we meet to seek the cluster aggregation.

Clustering analysis is also called unsupervised learning (Unsupervised Study), is mainly reflected in the clustering data object has no class label, required by the clustering algorithm of automatic calculation. Clustering analysis, spatial data has been widely used in the analysis of financial data, satellite images, medical image automatic detection, the relationship between experimental elements determining etc.

Wireless infrared transponder: This product is mainly used for equipment in the home can be infrared remote control, such as air conditioning, electric curtains, TV etc. Through the wireless infrared transponder, you can remote control air conditioning; you also can not get up close the curtains. This is a very meaningful products, it will be the traditional home appliance is immediately converted to intelligent home appliances.

The intelligent body except with segment agent the same function, such as acquiring traffic flow information, the control signal for the data support; their independent, can separate operation characteristics, regional agents can also according to the traffic flow operation, signal coordination of traffic intersection, with optimized control corresponding road network traffic, decide the corresponding control strategy and the signal timing results promptly issued parrot regions within each signal and transmits the traffic demand and control effect to a layer of decision-making layer, namely traffic management center.

$$SNR = 10 * \log_{10} \frac{\sum_{x=1}^M \sum_{y=1}^N P_{xy}^2}{\sum_{x=1}^M \sum_{y=1}^N (\tilde{P}_{xy} - P_{xy})^2} \quad (4)$$

Clustering or grouping, evaluate the output. Data preprocessing includes the choice of the number, scale and characteristics, it relies on the feature selection and feature extraction, feature selection to select the important feature, feature extraction feature transformation input for a new character, they are often used to obtain an appropriate feature set to avoid the curse of dimensionality "clustering", data pretreatment also includes outlier removal data, outlier is not attached to the general data or model of the data, so the isolated point often leads to the clustering results biased, so in order to get the correct clustering, we must put them out. Since similar is the definition of a class, then between the different data in the measure of the same feature space similarity for the clustering step is very important, because the diversity of types and characteristics of the scale, distance metrics must be cautious, it often depends on the application.

### 3. Using Improved RFID to Build Intelligent Home Furnishing and Transportation

Anti collision (collision) functions of RFID system, the price is more expensive than the system does not have the function to. When the individual users in the RFID system, if not necessary for a plurality of ID also know there is no need to select the collision resistant function of the reader.

Wireless intelligent socket: mainly used for switch control home appliances, such as it can automatically start the exhaust fan exhaust, in the hot summer for the airtight garage is an interesting application [10]. Of course, it also can control any you want to control home appliances, as long as the appliance plugs the wireless intelligent socket, such as drinking machine, electric water heater and so on.

A problem of radio frequency technology meets is reader collision, is received to a reader's information and another reader information conflict,

overlap. A method to solve this problem is to use TDMA technology, is simply the reader is directed at different times of the received signal, rather than at the same time, this will ensure that the reader will not interfere with each other. But in the same region of goods will be read two times, so it is necessary to establish the corresponding system to prevent this from happening, as is shown by Equation 5.

$$MEAN = \sum_{i=0}^{M-1} \sum_{j=0}^{N-1} F(i, j) / (M \times N) \quad (5)$$

The parking card according to different demands, issued monthly card (card), cards, special card (free card) and rent card (the temporary card) four types of cards: monthly cards and special cards in time limit; the stored-value card to balance limit; the temporary card along with a grab, simple convenient; in addition the monthly card and card of prepaid expenses, the yard management simple, active.

RFID can write another factor data is to distinguish the radio frequency identification system for RFID tag. The radio frequency identification system simple, RFID data are mostly simple (sequence) number, can be integrated into the processing chip, will never change. On the contrary, RFID tags can be written by a reader or a special programming device writes data. The RF tag data writing is generally divided into wireless is written with two forms and cable. The railway locomotive and it is lorry RFID application adopting a cable written work.

Wireless air quality sensor: the main sensor detecting the bedroom air quality is cloudy, it is very useful for you to go home and rest, especially families with infants is especially important [11]. It is through the detection of the air quality of indoor air is telling you the effect of health and related equipment optimization adjusting the air quality is initiated by the wireless gateway. Wireless doorbell: This is valuable for small-sized apartment or villa, as is shown by Equation 6.

$$\delta I_i = \begin{cases} I(P) - I(P_i), i = 0, 1, 2, 3 \\ I(P_i) - I(P), i = 4, 5, 6, 7 \end{cases} \quad (6)$$

Intelligent home furnishing controller operating system adopts the embedded Linux operating system with open source, through the reduction of transplanted to the hardware platform controller. The intelligent home furnishing controller Linux, ARM system, mobile phone and ZigBee module to form a whole, constitute an embedded system with complete functions, using ZigBee technology to realize wireless connection within the family of many nodes.

One of the important features of radio frequency identification system is to supply the RF tag. Passive RFID tags have no power. Therefore, the electromagnetic field energy obtained all passive RFID tag work must from reader to send in. In contrast, the active RFID tag contains a battery;

micro chip provides all or part of the work ("auxiliary battery") energy.

The low frequency RFID tag, referred to as low frequency tags, its operating frequency range is 30 kHz – 300 kHz. Typical operating frequency: 125 kHz, 133 kHz. LF tag is passive tags, its energy by inductively coupled mode from reader coupled coils in the near-field radiation. Data transfer between low frequency tags and reader, reader antenna radiation in low frequency tags for the near field zone. LF tag reading distance is generally less than 1 meter.

Wireless communication technology in intelligent home furnishing mainly include: IrDA infrared technology, Bluetooth technology and ZigBee technology. IrDA belongs to the point of the half-duplex communication of short distance, point, inconvenient use and high error rate, network mode is not applicable to the family; Bluetooth technology because of the limited network capacity, high cost, not suitable for home furnishing network application more nodes. The study adopted the transmission range is moderate, safe and reliable, high capacity of ZigBee network technology, intelligent home furnishing design of remote monitoring system, as is shown by Fig. 3.

RFID UHF and microwave band, referred to as the microwave radio frequency label, its typical operating frequency of 862 (902): 433.92 MHz, ~928 MHz, 2.45 GHz, 5.8 GHz. Microwave and radio frequency label can be divided into active and passive tag two tags. When working, RFID reader antenna radiation field in the far zone field, coupling between tags and reader for the electromagnetic coupling. Reader antenna for passive tags provides RF energy, the active tag wake [12]. The radio frequency identification system reading distance is generally larger than 1m, the typical case is 4-6 m, the maximum can reach more than 10 m. The reader antennas are usually of directional antennas, only in the reader antenna directional beam within the scope of the RFID tags can be read / write.

The topology of ZigBee network is mainly of 3 types: star, tree and mesh network. Mesh network fault tolerant ability, adaptive, long transmission distance, but its complexity is the highest; the star network has the characteristics of simple and low power consumption, simple to use, suitable for a family of small scale, low complexity of tree network is somewhere in between. Application of the star network in intelligent home furnishing, can obtain a higher price.

System matching electric block driveway gate is lifted, prevent to hit the car function; detection system using analog-to-digital advanced conversion technology, strong anti-interference ability, adapt to the harsh environment, has also increased the sensitivity and reliability of one's own knack in; the system can query cart, a yard full automatic light full words the red light and automatically stop the entrance into the car.



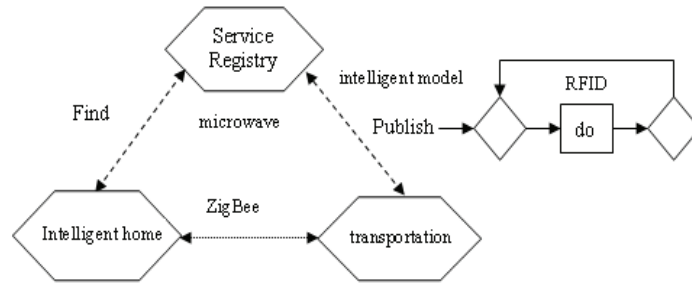


Fig. 3. Intelligent model of home furnishing and transportation based on improved RFID.

ZigBee technology for the low cost and it is low power consumption and low rate wireless communication market vacancy. The hardware of intelligent home furnishing controller by the advanced ARM9 embedded system, mobile phone module and ZigBee module; the embedded operating system Linux, the home network using ZigBee wireless network, security, system functions, to meet the needs of the future development of intelligent home furnishing.

Data storage capacity of microwave and radio frequency label generally confined within 2 kbits and large storage capacity does not seem to have much meaning, from technology and application perspective, microwave and radio frequency label is not suitable as a carrier of large amounts of data, its main function lies in identifying objects and completes the identification process without contact. Data capacity index typical: 1 kbits, 128 Bits, 64 Bits etc. Developed by Auto-ID Center of the electronic is product code EPC capacity: 90 Bits, as is shown by Equation 7.

$$\frac{\partial E}{\partial v_{ih}} = \frac{\partial E}{\partial Net_i(k)} \cdot \frac{\partial Net_i(k)}{\partial v_{ih}} \quad (7)$$

See the application of the every kind of RFID, the first problem enterprises want to ask is: "how do I put my existing system connected with the new RFID Reader?" The essence of the problem is the enterprise application system and the hardware interface problem. Therefore, the permeability is the key of application, correctly grasping the data, ensure the reliability of data read and effectively transmit data to the back-end system is a problem that must be considered. Between traditional applications and Applications (Application to Application) data transparent is solved by intermediate piece of architecture; similarly, architecture design middleware solutions will become the RFID application is a very important core technology.

The core controller system board for type S3C44B0X 32 bit microcontroller, processing and the discrimination of the data and through the MMS module and ZigBee module sends the information and instructions; extension plate is used to access the smoke, gas, infrared, home security state sensor; MMS module family security state information is

transmitted to the user mobile phone a system controller and receives a user message sent instructions; data crosslinked ZigBee module is responsible for the system board, between the expansion board and household appliances, as is shown by Equation 8.

$$MI_{FA}(f, a) = \sum_{f,a} P_{FA}(f, a) \ln \frac{P_{FA}(f, a)}{P_F(f)P_A(a)} \quad (8)$$

Software for the soul of the system, software design with friendly interface, convenient operation, simple maintenance as the basis and strive to practical function and improvement. Parking system software design includes: the system registry, system maintenance, archives management, card management, access control management, access management, query records, statistical statements, exit the system.

According to ABI Research Inc., before 2008, the global industry demand created by the RFID market size could reach \$20000000000, of which the software market accounted for about \$4700000000, integrated service revenue in 2010 will exceed RFID product revenue. With the development of hardware technology gradually mature, large software market opportunities to domestic and foreign information service producers who sustained attention and early input, RFID Middleware in the RFID industry applications in central nervous system, particularly by international companies concerned.

Service Oriented Architecture (SOA) target is to establish communication standard, breakthrough application-to-application communication barriers, to achieve business process automation, innovation and business model, make the IT more flexible and faster response to demand [13]. Therefore, the RFID Middleware in the future development will be in service oriented architecture based trend, provide enterprises with more flexible service.

The triple play in the network level is to unify existing expressway communication, monitoring, charging three electromechanical systems; at the operational level is the integration of data, audio, video three businesses. Triple play is the development trend of information is based on the expressway communication system for network transmission, transmission of voice, data and image

in the same network and can contain other traffic management information, providing network services to society.

#### 4. Intelligent Home Furnishing and Transportation by Improved RFID Web Fuzzy Clustering

Fuzzy clustering is due to the sample belongs to each category uncertainty degree; the sample expressed an intermediary category, which established the sample for the category uncertainty description, which can objectively reflect the real world, thus becoming the mainstream of clustering analysis. The concept of fuzzy partition was proposed by Ruspini, using the concept of people have proposed many kinds of clustering methods, typical are: method of relation and fuzzy relationship based on similar (including polymerization method and splitting method), based on the transitive closure method based on fuzzy equivalence relation, the fuzzy maximum tree method based on graph theory and data the convex decomposition, dynamic programming and is difficult to distinguish between method [14]. However, because the method is not suitable for large data volume, difficult to meet the requirements of real-time applications, so its application is not wide enough, so the research in this area is gradually reduced.

The algorithm is in the traditional C - means algorithm of fuzzy technology is introduced; based on the partition (Partition-Based) clustering method; based on the layer (Hierarchical-Based) clustering method based on density; (Density-Based) clustering method based on grid; (Grid-Based). Clustering method; and based on the model (Model-Based) Guo Xiujuan: Professor Yu Xianfa: phase angle relation method, most small method, arithmetic average minimum method, several He Ping were the most small method; absolute value index method.

Density clustering needs to scan the entire data set, the data space is divided into different squares, approximate representation of clusters and the use of small square and. The method may not be accurate, but this method for noise data and outlier insensitivity. This method can also be used for clustering spatial index structure, by calculating the super ball area density, but this method because of the need to maintain the index structure complex, so the efficiency problems of mass data; continuous based clustering: clustering objects mapped to model or hyper graph model, then according to the edges or hyper edges search connected node sets, as is shown by Equation 9.

$$\begin{cases} w_{j,\min}^{\xi}(m,n) = \frac{1}{2} - \frac{1}{2} \left[ \frac{1 - M_{j,AB}^{\xi}(m,n)}{1 - T} \right] \\ w_{j,\max}^{\xi}(m,n) = 1 - w_{j,\min}^{\xi}(m,n) \end{cases} \quad (9)$$

Clustering analysis is a very active research field in data mining and put forward many clustering

algorithm. Traditional clustering algorithms can be divided into five categories: partition method, hierarchical method, density based method, based on the grid method and the method based on model.

The 1 division method (PAM: PARTITIONING method) to first create a K partition, K is the number of partition to create; and then use a circular positioning technology through an object from a partition to another division to help improve the classification quality. Including the partition method of typical: K-means, k-medoids, CLARA (Clustering LARge Application), CLARANS (Clustering Large Application based upon RANdomized Search). FCM 2 level methods (hierarchical method) are to create a hierarchy to decompose a given data set.

RFID middleware is a kind of Middleware Oriented message (Message-Oriented Middleware, MOM), information (Information) is based on message (Message) forms, are transmitted from one program to another or a plurality of program [15]. Information to be asynchronous (Asynchronous) transmission and it is so the sender does not have to wait for the response. The intermediate function contains a message oriented is not only transfer (Passing) information, must also include the interpretation of data, security, data broadcast, error recovery, cyber source, find the location information and the cost path, priorities and debugging work extends with services, as is shown by Equation 10.

$$\sigma_j = \sum_k \delta_k v_{jk} b_j (1 - b_j) \quad (10)$$

Intelligent home furnishing network communication system has the following characteristics: the amount of transmitted data is small, without the transmission speed is too high; the capacity of the network, to meet a variety of household appliances in the family; the good real-time information, short time delay. RFID technical characteristics determine its can well meet the demand of intelligent home furnishing network, especially with the self-organization, self-healing ability, wireless communication technologies such as intelligent home furnishing ideal way of communication system.

The paper presents intelligent model of home furnishing and transportation based on improved RFID web fuzzy clustering. The system is mainly composed of a smart home furnishing a controller and a plurality of indoor monitoring RFID modules. The system model is shown in Fig. 4. Intelligent home furnishing controller through the interconnection of 2 wireless communication network, Internet and 2 cable lines of communication with external equipment to achieve the information and intelligent home furnishing controller and can be regarded as the digital home gateway.

This part of the experiment mainly is for user session in clustering analysis. Experience using UCI data number MSNBC set in the real data set, the data set of MSBN network station after data preprocessing all session set by households, a total of 8564745 session



records and the site has a plurality of intelligent furniture and intelligent transportation system, the number according to the two dimension set of  $985545 \times 252$  sparse matrix, as is shown by Fig. 4.

The experimental results of different clustering threshold (A) of the experimental results of a collaborative filtering recommendation method based on fuzzy clustering firstly users need for fuzzy clustering for all users, each user membership degree of fuzzy cluster with respect to on the basis of fuzzy clustering, fuzzy clustering for fuzzy clustering

which will affect the accuracy of recommendation method. In order to choose an optimal clustering threshold and it is respectively. Found from the experimental results. In the implementation of proposed method are 3 different clustering thresholds; in the selected data set are respectively crossed do 4 experiments. The experimental results as shown in Fig. 3, where the abscissa is the nearest neighbor to the target user number, the ordinate is the corresponding MAE value, the experimental results were obtained from the 254, 856 and 1245 threshold.

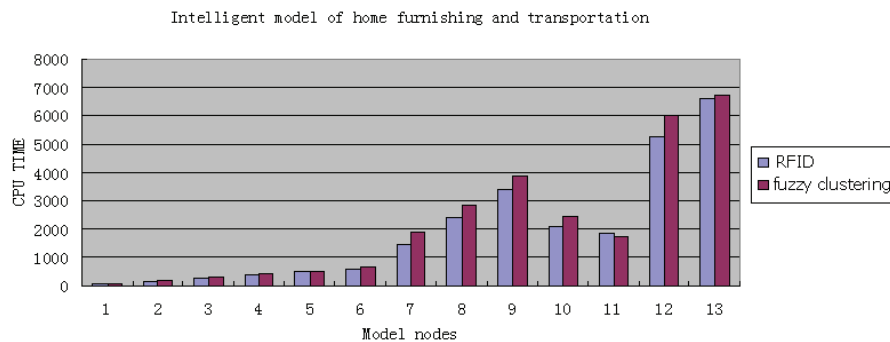


Fig. 4. Compare of intelligent model of home furnishing and transportation based on RFID with web fuzzy clustering diagram.

## 6. Conclusions

Architecture-centric (Infrastructure Centric) with the complexity of enterprise application systems, enterprise is unable to load Hot Code for each application programming Adapter, while facing the object standardization issues, enterprises can consider RFID middleware standard specifications provided by manufacturers. In this way, even if the storage RFID tag information database software by other software instead of, or read and write RFID tag and RFID Reader increase occurs, the application end without modification can handle it. The paper presents intelligent model of home furnishing and transportation based on improved RFID web fuzzy clustering.

FCM algorithm is the matter which belongs to the local search mountain climbing method, through clustering of raw P and dividing the alternating optimization between U matrix to find the local optimal solution, so it must start the iteration from a starting point for P or U, the problem that leads to an initialization algorithm. Research shows that the FCM algorithm strongly depends on the quality of parameter initialization, because the body is stored in two fatal weak points: the first one is the fuzzy clustering objective function is a non-convex function, stored in the local extreme points of large quantity, when properly will cause the algorithm to converge to a local extremism points and not to the data set of optimal fuzzy partition.

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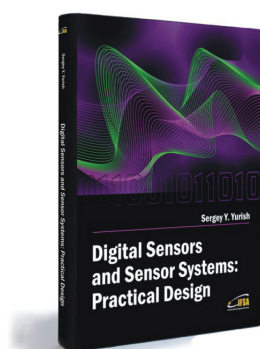
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## Digital Sensors and Sensor Systems: Practical Design

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